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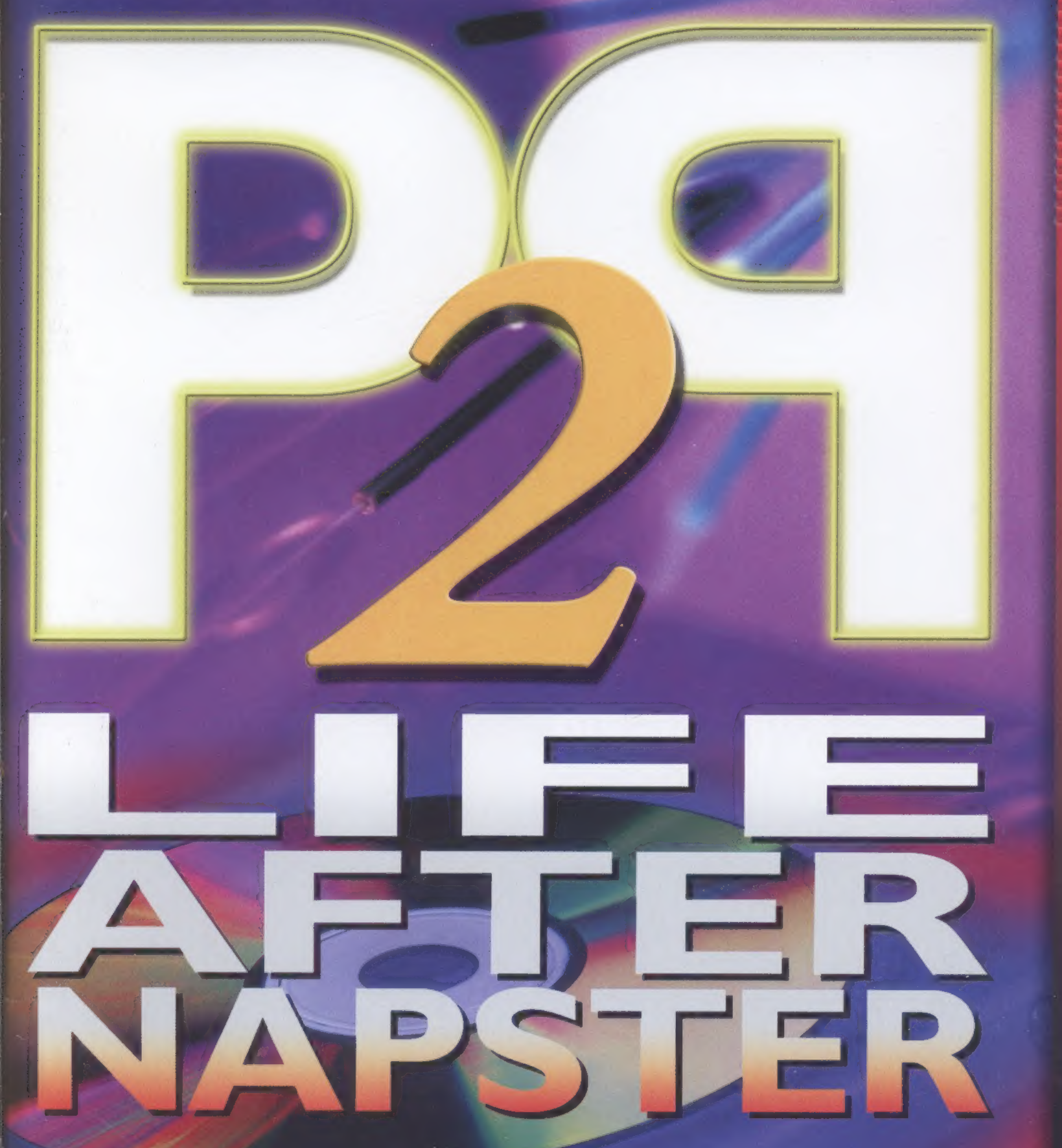

P2P LIFE AFTER NAPSTER

50 Alternatives To Napster

Our Top 5 Napster Replacements In-Depth

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Anand Lal Shimpi
Alex "Sharky" Ross
Kyle Bennett
Chris Pirillo
Pete Loshin
Lisa Lopuck
Rob "CmdrTaco" Malda
Joan Wood
Alex St. John

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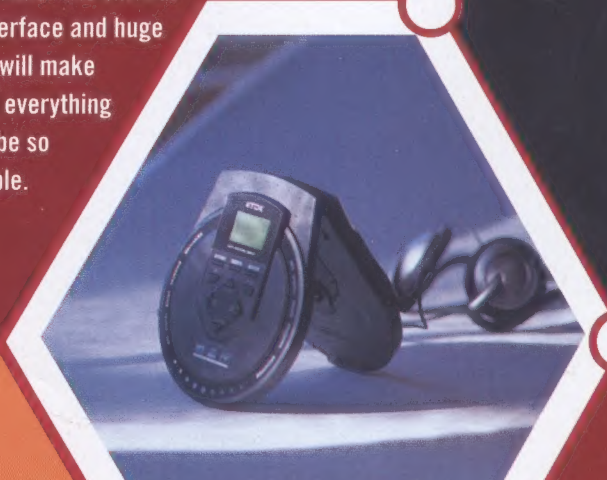

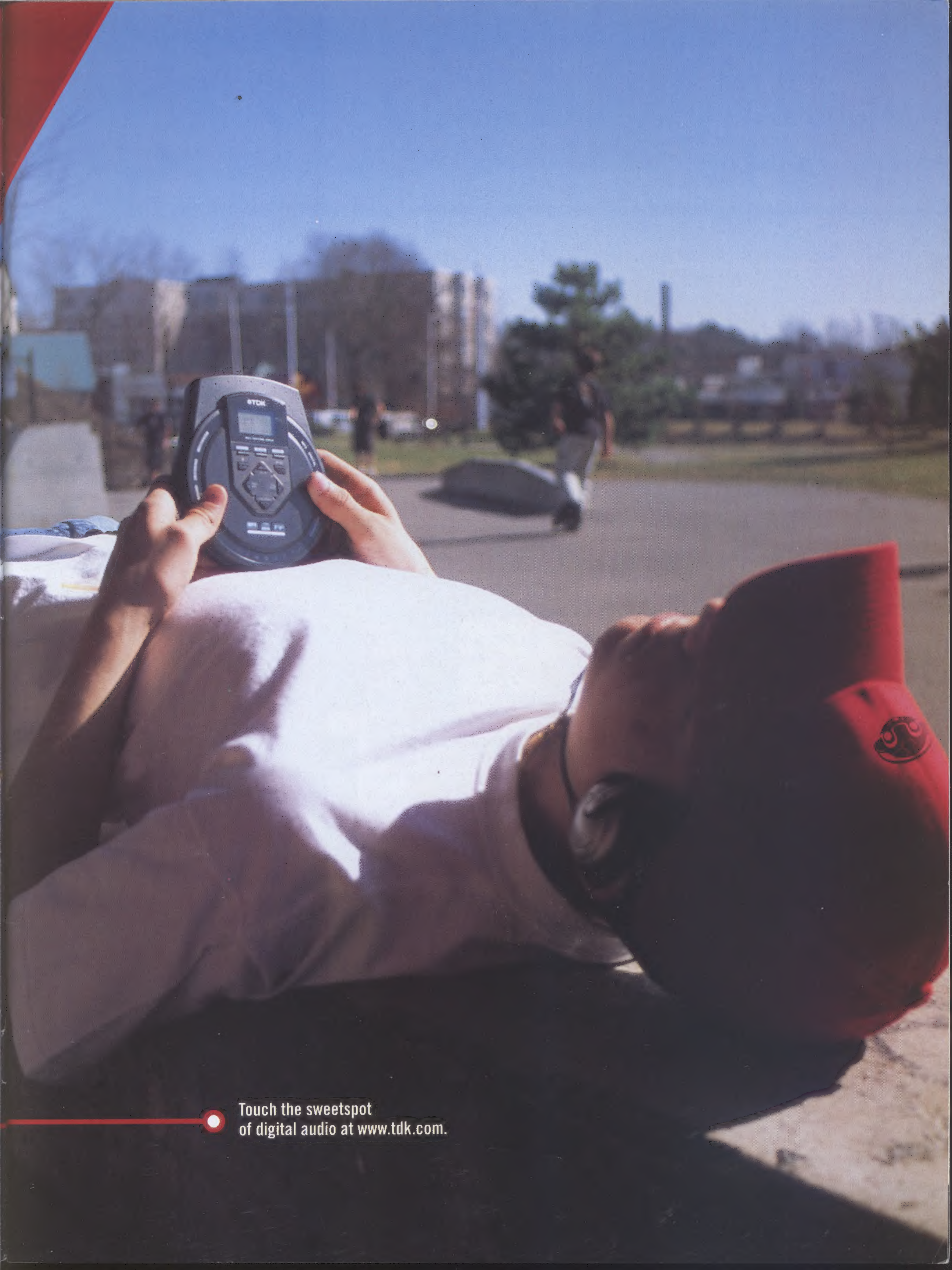

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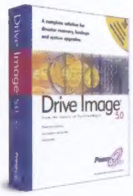

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GREETINGS FROM SAMITLAND

Welcome to the third issue of *Computer Power User*. It seems like only yesterday we released our baby into the cutthroat world that we all know and love: magazine publishing. Wow, funny how time flies when you're having a ball.

According to your feedback, we seem to be on the right track. Be assured that we will continue working to improve the magazine you have in your hands to ensure it's the magazine *you* want to read. So please, don't stop the chatter. We might not be able to answer every one of your e-mails, but we do read everything you send our way.

We have also noticed how much you enjoy reading what our expert columnists have to say, so we thought we'd go one better. We've added another expert to the list: Rob "CmdrTaco" Malda. Check out his debut "The Department Of Stuff" column on page 80. Rob founded the popular Slashdot.org Web site. You know, news for nerds, stuff that matters? You can surf to cmdrtaco.net/rob.shtml if you want to know more about him. Plus, hey, it'll stroke his ego, and that never hurts. He's a smart guy with some great insight, so don't miss what he has to say.

Now it's time for some (more) fun. Why don't you head on over to page 88 to get your monthly DVD Byte? If you're a fan of DVDs, then you've probably visited The Digital Bits (www.thedigitalbits.com), which is run by Bill Hunt and Todd Doogan. Trust me when I tell you these guys know their DVDs; I've been a big fan of their site for years. Todd will be picking out a DVD for you every month. Expect him to get on the soapbox from time to time, too.

Thanks for buying the magazine; thanks for sticking with us; and thanks for your many, many kind thoughts. Your comments have been flattering (enough to make us blush), but we are taking your suggestions straight to heart. I'll catch you here next month, same place, same time.

Samit G. Choudhuri, Publication Editor, *CPU*

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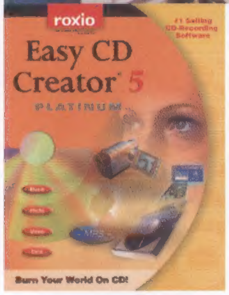

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Compiled by Cal Clinchard

In Hardware . . .

Proxim's Harmony Line
Chimes In With High-Speed Wireless

We've seen the 5.2GHz AR5000 802.11a chipset from Atheros, but now we're beginning to see the new wireless technology take off. Intel recently announced its support for the 802.11a specification for wireless LANs, citing superiority to the weak, distance-challenged 802.11b. Proxim (www.proxim.com) chimed in, as well, recently unveiling its Harmony family as the first set of 802.11a-compliant enterprise products.

The Harmony products offer 802.11a-compliant speeds up to 54Mbps (much faster than the 11Mbps 802.11b accommodates), but with Proxim's 2X mode, speeds can rev as high as 108Mbps. The Harmony family includes a controller for centralized LAN administration, stationary and mobile access points, and all the cards you'll ever need (PC cards for notebooks, CompactFlash cards for PDAs, and PCI cards for desktops). At press time, however, only the Access Point and CardBus Card were 802.11a-compliant; the remaining products were stuck with 802.11b.

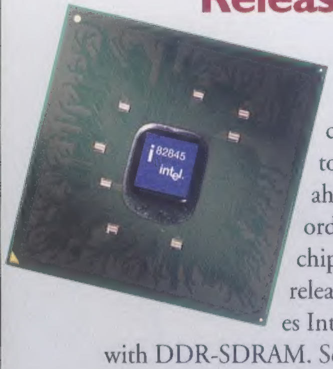
Proxim's products also reportedly work well with others, supporting 802.11b, the notorious WEP, and OpenAir. To its credit, Proxim also endows its 802.11a products with VPN tunnels and claims to be working toward 802.1x and Bluetooth support. Such compliance might come quicker than anticipated: Proxim released its Harmony 802.11a Access Point months ahead of schedule. ▲

Wireless Finds Its G Spot

The IEEE Standards Board announced development of 802.11g, a new wireless LAN standard that will operate in the 2.4GHz band. 802.11g is set to exceed the current 11Mbps wireless LAN data rate with rates greater than 20Mbps (although some companies make 802.11a-compliant products that reach much higher speeds).

The FCC announced its permission for developing frequency hopping systems in the 2,400 to 2,483.5MHz band in August 2000. 802.11g's backwards compatibility with the mutually exclusive 802.11a (licensed for use only in North America) and 802.11b (licensed for use in North America, Europe, and Asia) practically assures its eventual popularity. ▲

Latest Intel 845
Released Early?



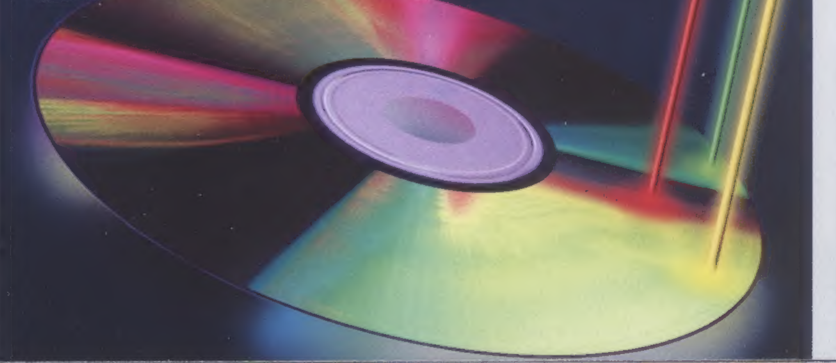
As we go to press, our rumor mole claims that Intel intends to ship its new 845 chipset ahead of schedule, taking orders in advance of the chipset's official January release. The new 845 harnesses Intel's Pentium 4 processor with DDR-SDRAM. See page 100 for further mention of the 845 chipset. ▲

Zen & The Art Of Optical Acceleration

Early in 2001, the picture looked pretty. With optical drive manufacturers such as Actima, LiteOn, and LG Electronics on board, U.K.-based Zen Research (www.zenresearch.co.uk) began rapidly developing its Multibeam technology for making increasingly faster CD and DVD drives. Although the usual strategy for increasing drive ratings is to crank up the rotation speed and build better mechanisms that can reliably read and rip data at higher speeds, Multibeam technology offers a much-heralded alternative.

Here's the Zen koan upon which Multibeam technology might operate: How can you make an optical drive faster without increasing its speed? Using Multibeam pickups, optical drives are able to read multiple tracks simultaneously and process the data through a custom ASIC (application-specific integrated circuit) design. The result, according to Zen, is a manageable speed, which in turn provides less vibration, less noise, and a higher degree of reliability.

Many analysts agreed with Zen that Multibeam held a great deal of promise, but as 2001 drew to a close, Zen reported serious financial losses and a 65% staff cut in its Multibeam division. Blaming the decline in the PC market worldwide, Zen is no longer providing support to OEMs that licensed its Multibeam technology and is maintaining a core group of just 14 engineers to keep Multibeam alive. At press time, Zen had no active Multibeam projects and expected no revenues from the technology. ▲



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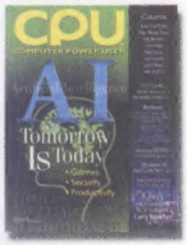

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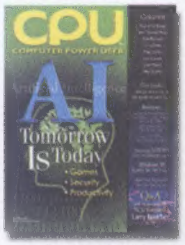

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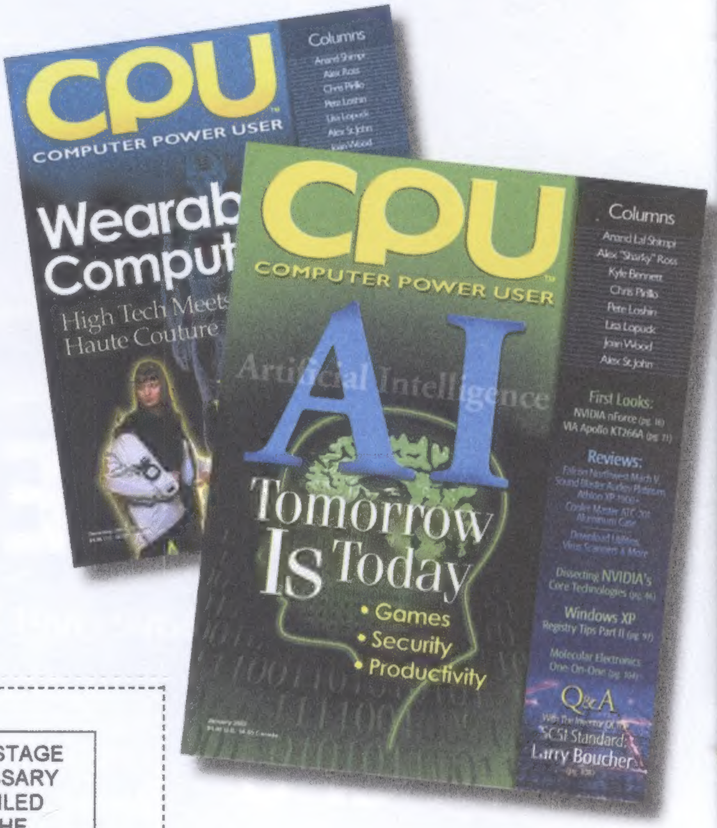

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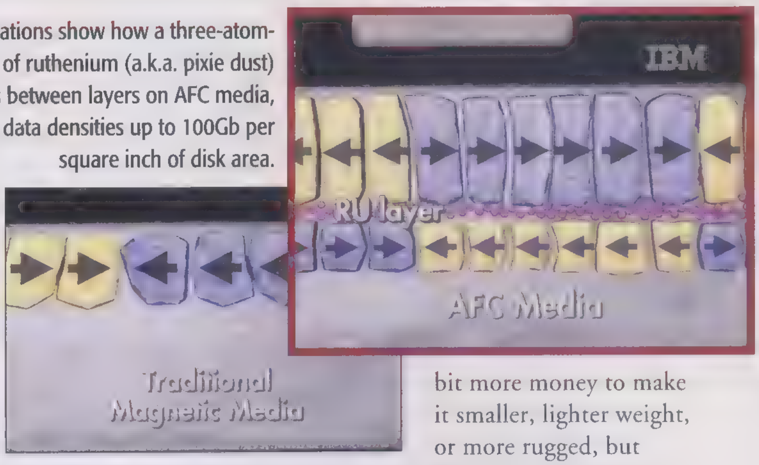
Mini High-Density Hard Drives Spring From IBM's Pixie Dust



IBM's illustrations show how a three-atom-thick layer of ruthenium (a.k.a. pixie dust) resides between layers on AFC media, enabling data densities up to 100Gb per square inch of disk area.

We know you've heard all about pixie dust, IBM's code name for AFC (antiferromagnetically-coupled) media. But in a recent development, IBM recently debuted a 120GB 3.5-inch desktop drive (Desktar 120GXP; $349) and a 60GB notebook version (Travelstar 60GH; $429), and indicated smaller drives are right around the corner.

AFC technology is "going to drive larger capacities in the same form factor, and it's also going to enable this transition—which we think is going to occur in the industry in the next couple years—to smaller disk drives. It's going to mean lower power, lower weight, quieter (less acoustic noise) disk drives," says Currie Munce, who holds dual positions: director, Storage Systems and Technology Research at IBM's Almaden Research Center and director, Advanced Hard-Disk-Drive Technology at IBM's Storage Technology Division.

According to Munce, consumers will "start to see, potentially in the next couple years, 2.5-inch disk drives go into desktop machines," as well as "more hard-disk drives designed into the emerging class of handheld devices. So this technology will enable very reasonable capacity sizes in these [much] smaller form factors."

Furthermore, consumers needn't brace themselves for significantly higher costs. "Depending upon the application, you [could pay] a little bit more money to make it smaller, lighter weight, or more rugged, but roughly a 2.5-inch design for a desktop is probably going to be roughly the same price as a 3.5-inch design for the desktop," says Munce. "We anticipate users will start making decisions not purely on capacity, but more based upon other product attributes such as power." ▲

New Supercomputers Enable Accurate Climate Tracking

With Mars mission failures and successes making major headlines for NASA, the administration quietly made more news when it installed two new supercomputers for tracking and assessing climate changes. Benefiting from Silicon Graphics' (www.sgi.com) latest developments with its patented NUMAflex modular computing design, the first supercomputer to contain a 1,024-processor shared memory system will vastly improve the data NASA scientists and others use to study the ways in which humans affect the earth's climate.

The latest product in Silicon Graphics' Origin 3000 server series, the SGI Origin 3800, is a 512-processor single-system image supercomputer. NASA installed a 1,024-processor version at its Silicon Valley-based Ames Research Center and the 512-processor version at its Goddard Space Flight Center in Greenbelt, Md. Collaboration between NASA and SGI for single-system shared memory research began 3 years ago, and these supercomputer implementations mark the current culmination of those efforts.

Although the SGI 2000 server series included products using 128 to 512 CPUs, the SGI Origin 3000 server series increases the number of CPUs in its product to 1,024. Using 512- and 1,024-processor systems, NASA will be able to generate climate models at speeds four times faster than was previously possible and achieve resolutions two times sharper. According to NASA, the goal is to provide ever-better climate models for earth science, government, and industry researchers who base many decisions on the data's accuracy. ▲

The SGI Origin 3800 server x5

In Software . . .

DVD-Based Navigation On The Rise

In 2001, only 1% of cars, vans, and light trucks on the market had factory-installed navigation systems. Due to a recent upsurge in demand, the automotive industry is preparing to install these systems in more vehicles. According to Frank Forkin, partner and executive director of automotive research at J.D. Power and Associates, the 2001 model year saw 175,000 factory-installed navigation systems, but the 2002 model year will see 240,000 factory-installed navigation systems.

Denso and Alpine, two Japanese manufacturers, have been swapping places for auto manufacturers' top choice in navigation systems. You can find Denso's systems in a number of Lexus models and the Jaguar S-Type, while Alpine's systems show up in models from Acura, Jaguar, and Mercedes-Benz. Companies taking third place include Bosch (in Audi and Mercedes-Benz vehicles), Mitsubishi Electric (in Volvo), Siemens (in Porsche), VDO (in BMW), and Xanavi (in Infiniti).

Alpine's DVD-based navigation system for the 2002 Acura TL Type-S.

Demand for navigation systems has increased largely because the software now comes on DVD rather than CD media. According to Forkin, DVD-based "systems are quicker [and] have more opportunity for geographical coverage." Because DVDs pack more information than CDs, DVD-based systems cover a much larger geographical area per disc than do CD-based systems. Relying on fewer discs is a plus for typical users, 35% of whom use navigation systems to find routes to unfamiliar locations (based on a J.D. Power and Associates 2001 Navigation Usage and Satisfaction Study). "If you're traveling," says Forkin, "when you probably need navigation systems the most, the last thing you want to do is call up somebody and have to pay for another disc."

Navigation systems, which employ GPS technology and touch-sensitive LCD screens, haven't received entirely rave reviews. For example, some users have reported frustration when the systems don't take road construction and detours into consideration. On the other hand, more than half of the 6,000 consumers polled for the J.D. Power and Associates study report satisfaction to the point that they would recommend the system to others. The only widely acknowledged drawback to current systems is poor manufacturer support. But U.S. customers have a lot to look forward to: Future systems will reportedly include improved customer support and more features, such as Internet access, hands-free support, and even real-time traffic updates. ▲

Software Shorts

Here are a few interesting nuggets we found right before press time.

Formerly known as Sigma: The Adventures of Rex Chance, the 3-D game Impossible Creatures is slated for a 2002 release.

Impossible Creatures Actually Possible!

Sigma: The Adventures of Rex Chance, the wildly popular 3-D RTS, is now slated for an early 2002 release under a new title: Impossible Creatures. Relic Entertainment (www.relic.com) produced Sigma, but Microsoft is set to release the Impossible Creatures reincarnation. Microsoft's Impossible Creatures representative didn't respond to our request for more information, but it appears the game is undergoing a few enhancements centered on multiplayer options and support for user modifications. ▲

Is That A Hockey Player In Your Pocket?

Unimobile (www.unimobile.com), a market king of wireless messaging, has joined forces with Ticketmaster and the NHL's Carolina Hurricanes to provide customers with a personalized ticket-offer application for Hurricanes fans. Based on customer-defined preferences (this is an opt-in deal), Ticketmaster will send alerts to customers' pagers or mobile phones as soon as tickets become available. Customers can then dial a specified phone number and punch in a promotion code to purchase tickets. ▲

CD Piracy Saga Continues

BMG Entertainment recently ran into an unexpected snag following its U.K. release of Natalie Imbruglia's latest CD, "White Lilies Island." BMG surreptitiously included anticopying software on the CD, which rendered the CD unplayable on some consumers' equipment. Complaints ensued, and BMG was forced to issue replacement CDs. This might hinder the Universal Music Group's (www.umusic.com) plans to press CDs with software that allegedly makes copying CDs "impossible." Meanwhile, the RIAA (Recording Industry Association of America) reported that by midyear 2001, its Anti-Piracy Unit had aided in 1,762 arrests, an 89% increase over the same time period the year before. Expect equally significant antipiracy announcements as the RIAA continues to step up its efforts. ▲

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Internet . . .

.biz Arrives

The new .biz TLD (top-level domain) is here, and a number of sites have begun selling domain names with the new extension. Approved last November by the nonprofit regulatory organization ICANN (Internet Corporation for Assigned Names and Numbers), .biz will undoubtedly become the TLD of choice among Web-only and brick-and-mortar businesses alike.

A mind-numbing array of businesses use .com (and quite a few use .net); only time will tell whether .biz will, as some domain sellers predict, overtake .com in popularity and sheer numbers. But that looks like a good bet because, despite the sagging economy, the exponential growth of domains continues.

So where do you sign up? It doesn't take much digging to find out, but a few popular choices include BuyDomains.com (www.buydomains.com), Domain-It! (www.domainit.com/biz), and Domain Direct (www.domaindirect.com). Prices start around $30 per year and require a 2-year minimum purchase.

NeuLevel (www.neulevel.com) is a joint venture (it combines two companies, NeuStar and Melbourne IT) and holds the distinction of being a neutral third-party manager of the .biz registry. Surf over to its Web site and click Register Now For Yours! to see a list of accredited registrars. ▲

MyPalm R.I.P.

Handheld manufacturer Palm is known for participating in successful teams. It recently teamed with Intel's Xircom and others to simplify the connection process between Palm owners and wireless LANs and Rand McNally to provide handy road atlases for certain PDA models. But Palm's acquisition of Anyday.com in 2000 didn't go as well. Palm molded Anyday.com into MyPalm (my.palm.com), a Web-based personal calendar and address portal for Palm owners. But Palm recently linked a message to the site stating that the portal's Date Book, Address Book, To Do, Reminder, and Memo Pad features would be discontinued effective Jan. 10, 2002 (when we went to press). As of that date, @palm.com e-mail addresses would also be defunct, and only Palm.Net wireless service subscribers will still see some benefit. Palm did not reply to our request for further information. ▲

The Business Of Staying Put

Since the Sept. 11, attacks, there has been a groundswell of corporate and home consumer interest in everything remote, whether it's offsite storage, remote technical support, or online conferencing. Manufacturers have reported increased demand for DVD storage media, wireless phones, and videoconferencing hardware and software.

Netspoke (www.netspoke.net) stands to grow substantially as a result of this demand. Netspoke's Concall Express provides 24/7 real-time Web-based conferencing that requires three things of its users: A telephone, a PC with Internet access, and a Java-enabled browser. You'll also have to pay a flat 32 cents per minute per participant to use Concall Express. (Although Netspoke sometimes makes special arrangements for subscribers committed to a high-usage level.)

Subscribers can schedule conferences at their convenience, inform participants of the schedule, and provide participants with an access code, phone number, and (optionally) a password. Subscribers don't need to inform Netspoke in advance; once they've signed up for the service, they can use Concall Express any time, any place. The moderator interface has technically-disinclined business users in mind; it looks professional and is intuitive to navigate.

A relative newcomer, Netspoke started in 1998 and has since doubled its revenues each year. Netspoke currently has more than 6,300 subscribers, including Road Runner high-speed Internet access, Conseco, the Hard Rock Cafe, and (ahem) Frederick's of Hollywood. CEO Scott D'Entremont expects Netspoke's staff to double in size by the end of 2002.

According to D'Entremont, "Today most of the services [Netspoke] offers help business people do real-time communications and collaboration, and we're just entering the asynchronous market. . . . Probably within the next 12 months, we'll roll out a service that allows you to collaborate [in] a team space, as well." Indeed, you can visit the Netspoke Web site for a demonstration of aSync, a product geared toward distance learning, sales, and training. aSync lets users create online presentations (complete with sound) that participants can access anytime. ▲

New On The 'Net

Gather 'round, kiddies. Here's a handful of sites that have recently made their way to the Web.

Prepare To Funk

The Technics legacy site (www.technics1210.com) is fantastic on two fronts: It's an audiophile's dream, filled with graphics and sounds related to Panasonic's sub-brand Technics. It's also a streamlined, Shockwave-powered site that's fun to explore, especially if you have a broadband connection. If you're using a 56Kbps modem, some pages take a few seconds to load. Click The Legacy to experience an overview of Technics' 30-plus years in the hi-fi biz, including products (such as 1970's RS275 tape deck and 1979's SL-10, the "world's first album-jacket-size turntable") and cultural icons (such as Van McCoy's "The Hustle" and Studio 54). Or click Deck Story for a complete history of the Technics turntable.

Told You So

Seriously. This site for Told You So Productions (www.toldyouso.net) is a DVD-lover's dream, filled with DVD release information and industry news that's updated daily. Click a DVD title and view the DVD equivalent of liner notes. Major credits and cast information is there in a truncated sort of way (it doesn't, for example, tell you the roles the actors played), but DVD specs and content special features are listed in every detail, even down to the type of case the DVDs are packaged in. Top picks, forums, and favorites lists such as the American Film Institute's Top 100 are available, as well. Make this your first stop for everything DVD. ▲

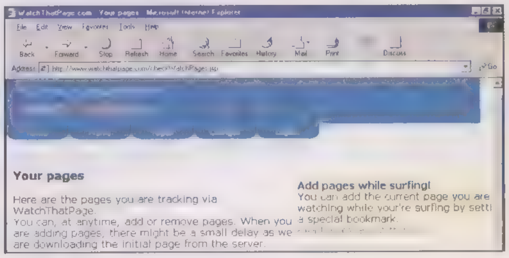
Save Our Cookies!

The IAB (Interactive Advertising Bureau UK; www.iabuk.net), an organization with a professed mission "to support the development of the interactive commercial markets" and "to increase the Internet advertising market," has initiated a "Save Our Cookies" campaign to thwart an EU (European Union) cookie-crushing proposal. The proposal aims to prevent Web sites from delivering any unsolicited data but fails to consider that users already have methods for controlling cookies at their disposal. The IAB reports that cookies don't pose a threat, and their absence will result in unavailable and slow-loading pages for users, not to mention less effective Web site management. At press time, the fight continued; visit the IAB site for the current low-down. ▲

Web-Surfing Concierge

Do you visit a number of sites on a regular basis, sometimes just to see what's new? If you want a way to simplify that task, check out Watch-ThatPage (www.watchthatpage.com).

This free, Web-based service doesn't require end-user software. You simply register online and submit an unlimited number of URLs for your personal watch list. The coolest feature lets you add pages to your watch list while surfing. On your home page, click the Read More About This link under the Add Pages While Surfing! heading and follow the instructions. Then, whenever you find a page you want to add to the watch list, select Add To WatchThatPage from the Favorites menu. A small pop-up window acknowledges the addition.



Your pages

Here are the pages you are tracking via WatchThatPage.

You can, at anytime, add or remove pages. When you are adding pages, there might be a small delay as we are downloading the initial page from the server.

Add pages while surfing!

You can add the current page you are watching while your're surfing by setti a special bookmark.

The registration process lets you define the frequency of e-mail notifications you want to receive (daily, weekly, or multiple times per week), whether you want to see an explicit list of Web page changes or a list of URLs that contain changed information, and whether you want to be notified of pages that are broken or contain errors. ▲

BIOS Upgrades Available Online

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Check out www.smartcomputing.com/cpumag/feb02/bios to see the entire upgrade list.

Manufacturer	File/Date Available	URL
Gigabyte	8IDX_F5 version F5 11/15/2001	www.giga-byte.com/support /support.htm
Gigabyte	7VTXE_F4 version F4 11/15/2001	www.giga-byte.com/support /support.htm
[illegible]	MS-6391 version 1.2 11/20/2001	www.msi.com.tw/support/bios/bios .php?model=MS-6391
MSI	MS-6547 version 1.3 11/21/2001	www.msi.com.tw.support/bios /bios.php?model=MS-6547
[illegible]	K7VX Dragon Plus 2MB K7VXA_2BA1 version unknown 11/15/2001	www.soyousa.com

Compiled by Steve Smith

You Get Paid For That?

If you missed your chance to be a rock star but still want to get paid for playing around all day, read on. We found a description on ComputerWork.com for a job we think you'd like. Here's our take.

Raytheon Polar Services
Denver, Colo./South Pole
Manager, Special Projects

You can beat the heat and flex your tech management skills all at once. Raytheon needs someone with 10 years of IT project management experience, someone who understands LAN/WAN and communications systems and doesn't chill easily.

The kicker is that you will be working with and for teams stationed at the South Pole. Raytheon is the principal contractor for the National Science Foundation's Antarctic Program. Although you will be stationed in Denver most of the year (which is known to get cold enough, by the way), "this individual will need to deploy to the South Pole for approximately two months per year to check on South Pole Modernization Project's progress," says Raytheon technical recruiter Jennie Anderson.

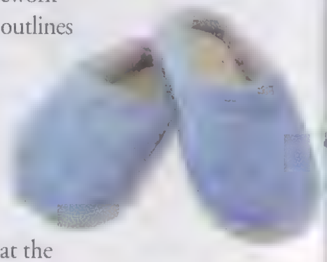
"South Pole Modernization Project?" Exactly how "modern" is the Antarctic expected to get? ▲

Telework

Gets A Boost From Uncertain Times

Teleworkers unite: You have nothing to lose but your cubicles. Since Sept. 11, more employers, including the U.S. Government, anticipate letting staff work from home more. IT bible *Network World* polled 100 readers recently and found that 40% expect an increase in telework over the next year. Almost half say that employees are the ones asking for these more flexible arrangements. Also cited were the need to reduce overhead (38%), desire to expand telework benefits (32%), and lack of office workspace (23%).

The U.S. General Services Administration and U.S. Office of Personnel Management are serious about letting civil servants work in their pajamas and fuzzy slippers. Its new Interagency Telework /Telecommuting site (www.telework.gov) outlines an aggressive program to "take a proactive approach that seeks to extend telework to the widest range of employees possible," according to the site's policies. "Agencies should begin with a presumption that all positions are appropriate for telework."



This makes some sense, considering that the president himself could be seen as a teleworker. After all, isn't the White House the world's most elaborate home office? ▲

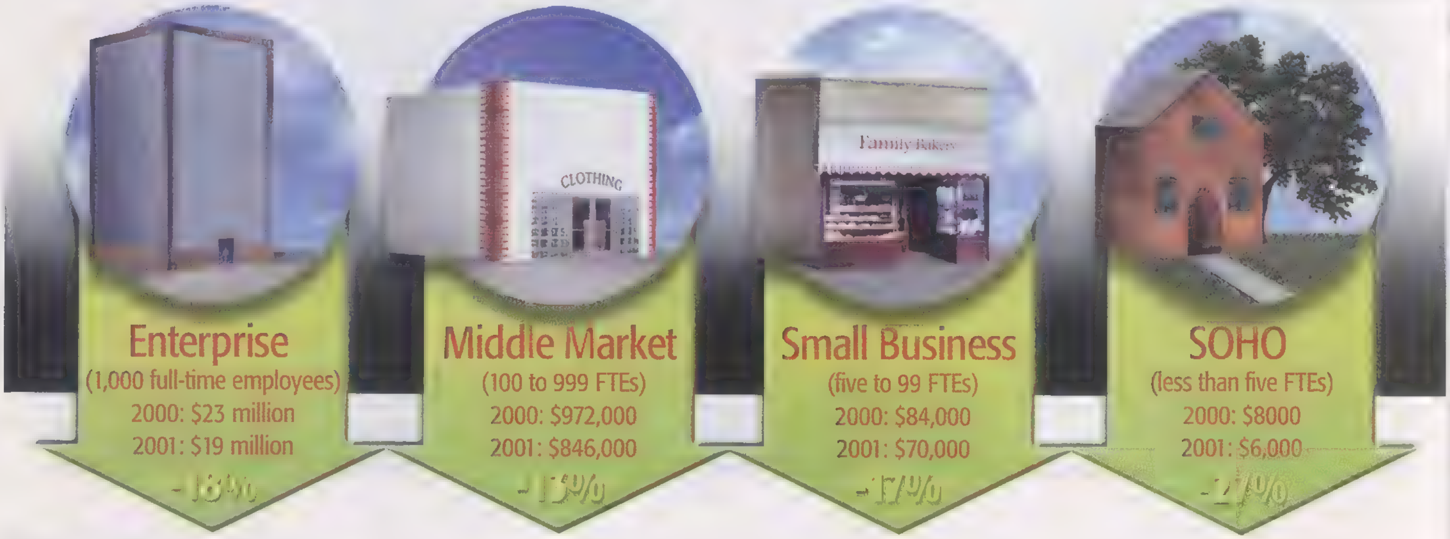
Oops! IT Will Take Its First Fall

Booming for a decade or more, the IT market's famed immunity to general economic trends may be breaking down. Research firm Cahners In-Stat predicts a 12% drop-off in overall corporate IT spending when the receipts for 2001 are counted. Because the overall drop in IT spending reflects many different-sized companies and changes in the market size, that 12% decrease is rosier than the average spending drops In-Stat is seeing at individual companies of different sizes. (See chart.) This is the first time in 10 years IT spending has decreased.

The downturn began before the terrorist attacks, but those events accelerated matters, says Kneko Burney, director, eBusiness Infrastructure and Services Research, In-Stat. Many businesses dumped too many resources into IT in 2000 and need to scale back. "Business decision makers are currently in a holding pattern, waiting for new budgets and operating plans for next year. Once the new year dawns, and budgets, no matter how much smaller, kick in, buying will resume, though likely at a moderate pace. As a result, In-Stat expects spending to increase in 2002 slightly over 2001 levels. However, IT investments may not reach 2000 levels again until well into 2003, particularly among smaller firms," she says. ▲

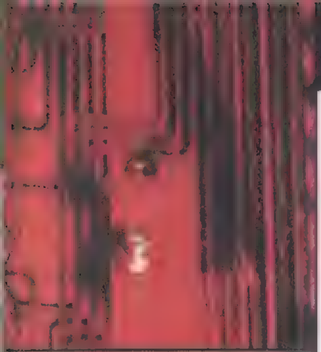
Average IT Spending

Source: Cahners In-Stat Group



by Alex St. John

The Piracy Myth



Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent, a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

When I was a teenager I was a hacker. I was in love with the Commodore 64 personal computer. The Commodore had many wonderful games distributed for it on floppy disks. At first the games were fun, but then I discovered that it was often more entertaining to try to figure out how to copy them than it was to play them. Developers of Commodore 64 games invented the most ingenious methods for preventing hackers from copying their games, which only made the challenge more enjoyable. This game of piracy cat and mouse between hackers and developers spurred the advent of next generation game consoles that used cartridges instead of floppies.

I'm not proud of my history in this regard as it took a little age and maturity to realize that my behavior was harming the game developers I so revered. The experience, however, shaped my perspective on piracy and computer security.

It's impossible to stop a semi-clever programmer from copying any audio or video on the PC.

Twenty years ago there were threats of lawsuits from major publishers because the widespread use of Xerox machines would enable people to easily reproduce and distribute copyrighted written materials. At about the same time the movie industry had similar fits about the introduction of the VCR. Both industries have expanded dramatically since that time in spite of the dire threat of easy piracy. I find it interesting that we hear so much on the subject around music piracy, but nobody is complaining about how easy it is to publish a ripped copy of Harry Potter on the Internet for anybody to read. Did book publishers realize that protecting text on the Internet was simply impossible, or that people's ability to distribute it freely was a net boon for the Harry Potter brand?

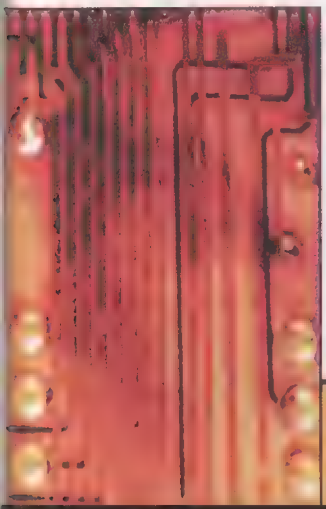
Here's the nasty truth for people in the media business who may not want to hear it: It's impossible to stop a semi-clever programmer from copying any audio or video on the PC. The raw full fidelity bits can be scraped directly off the hardware as they are being played. No encryption technique, however powerful, can stop it. The only way to prevent such copying requires a change to PC hardware and OS architecture so fundamental that even if it existed today it would take five years to become ubiquitous enough to be relevant. Powerful encryption techniques are irrelevant; the bits ultimately have to be reconstructed into an easily stealable form to be played. There is NO software solution. The moment music or video exists in CD, DVD or VHS format, it's gone and it can't be stopped.

Now, I'm no freeware nut. I understand in my old age that folks need to get paid if we want cool content from them, but the problem can't be rationally addressed until the media companies stop dreaming about being able to prevent copying.

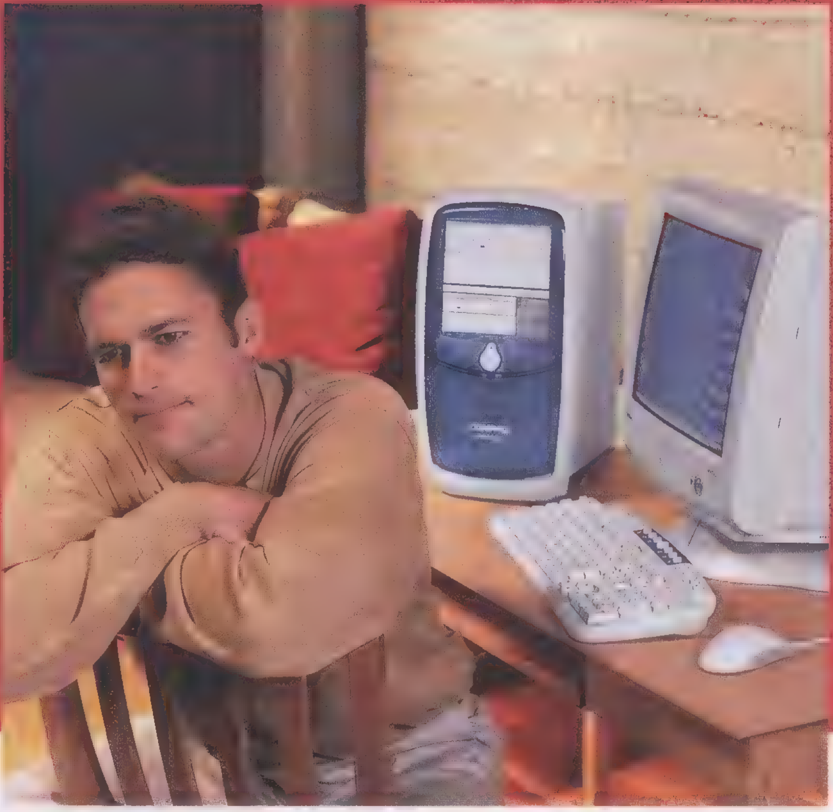
Contrary to the popular belief that standards are a good thing, I would assert that standard audio and video formats make piracy easier and stifle innovation. Getting the bits out is easy; getting the bits into a compressed distributable format can be hard. If the compression techniques are public and well documented, then anybody who can rip data can author it with the same fidelity. Industry emphasis on standard formats makes it more difficult for companies to independently innovate better compression techniques that add value to the data they are representing. The existence of standard players is a major contributor to what makes copying data worthwhile. Copying a proprietary N64 cartridge, for example, is not worthwhile because I still need to own an N64 to play it and I would have to pay more money to have it put on another cartridge.

Piracy is a very powerful marketing engine. I've heard many studies about how many "billions" of dollars of revenue are lost every year to it, but who measures how many "billions" of dollars the media companies are generating from grass roots marketing? As a teenager I couldn't afford to buy every Commodore 64 video game ever published, but I certainly spent every disposable dollar I had on Commodore-64 products. Did they really lose the money I didn't have to spend in the first place? Piracy is not a wave that media companies can stop, but it is one they can ride. ■

Speak back to the halo man at TheSaint@cpumag.com.



BUILT
ON A
RATHER
SIMPLE,
INNOVATIVE
IDEA.



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56K ITU V.90 Modem[4]
Integrated 10/100 Network Interface Card
Soundmax II Digital Audio
JBL Platinum Speakers with Digital Audio Port
32 MB nVidia M64 Pro
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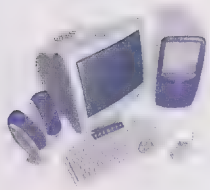

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Presario 5000T-1.7

$899[‡]

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128 MB PC1200 DDR SyncDRAM
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48X Max CD-ROM Drive[6]
56K ITU V.90 Modem[4]
Integrated 10/100 Network Interface Card
Soundmax II Digital Audio
JBL Platinum Speakers with Digital Audio Port
32 MB nVidia M64 Pro
Compaq CV535 15" Monitor (13.8" VIA)
Six Months of AOL Internet Access Included[5]

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Compaq CV735 17" Monitor (16.0" VIA): Add $50

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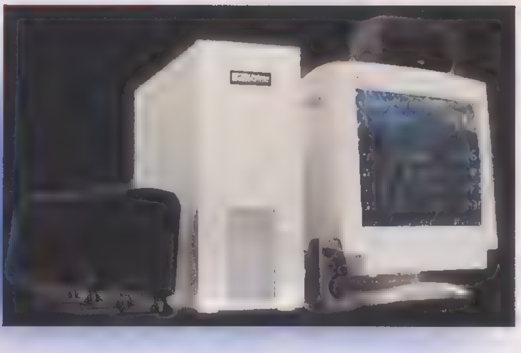
EXTREME HARDWARE

These Gizmos Don't Sing It, They Bring It

It's powergeekery in motion this month in Extreme Hardware. Throttle up and peel out with a Mach V from Falcon Northwest, and don't forget to lay down some PhatNoise while you're at it. And don't let some plastic action figure backtalk you. Take it into the ring, Ready 2 Rumble style. Finally, if all this exertion taxes your bad self, veg out with a big transfusion of plasma from Sony.

by Marty Sems

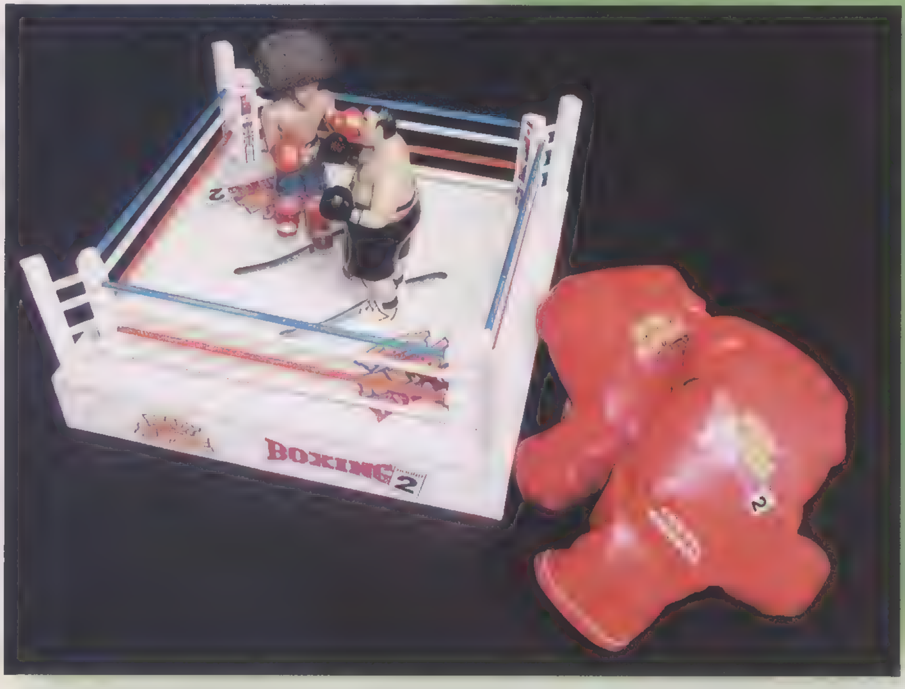


Falcon Northwest Mach V

Hard-core "Speed Racer" fans get all squirmy over his James Bondian supercar, the powerful Mach V. We get more revved up dreaming about Falcon Northwest's super gaming PC of the same name (www.falcon-nw.com). The company's ever-changing Mach V lineup always includes a top system built with some of the best components around. At this writing, the $6,078 king beast comes with dual Athlon XP 1800+ MPs, 1GB of PC2100 DDR, two 40GB IBM Deskstar 60GXPs in a RAID, a VisionTek 64MB DDR GeForce 3, a Klipsch Pro Media 5.1 surround sound system, and much more. Ohhhhh, baby. Turn the key, feel free to roach the tires, and watch out for the flow of hot lava on Turn 4. (See page 20 of January's CPU for a review of a more price-friendly Mach V model.)

Wireless Ready 2 Rumble Round 2 Tabletop Boxing

Fluff your 'fro and don your "have a nice day" boxing gloves. It's time to walk the walk and get inside the ring. This smack-talking virtual boxing game from Manley Toy Quest (www.manleytoyquest.com; about $90) is based on the Midway arcade game Ready 2 Rumble. You can take to the ring as either Afro Thunder or Joey T. Other equally entertaining characters are also available to choose from. It's not Rockem' Sockem'; it's better. You'll actually get some upper-body exercise with a game like this, and not just numb your thumbs. While you're wearing the included boxing gloves, digital sensors in the gloves pick up the jabs, hooks, and uppercuts you throw and wirelessly tell your character in the ring to dish out your beatdown on your opponent by proxy. This is the same company that markets VR gear to make you think you're fighting virtual ninjas. Don't get punch-drunk, though, or you may just start to hear the crusty ghost of Burgess Meredith urging you on from ringside.

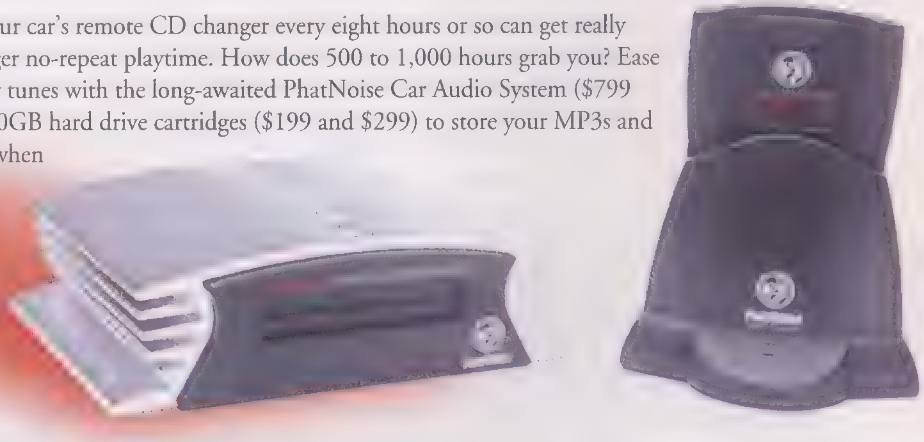


The Sharper Image Personal Warm+Cool System

Overclocking instability got you hot under the collar? It may be time for a Peltier device. No, not on your egg-frying CPU—on your head. Slip this collar around your neck and . . . well, we're not saying you'll look cool. We're saying you'll *feel* cool. The SI731LG2, made and sold by The Sharper Image ($69.95; www.sharperimage.com), uses the principles underlying Peltier devices to chill metal plates lining the inside of the collar, and by extension, you. Put way too simply, passing electricity through a Peltier device takes heat from one side and moves it to the other. What better way to keep your cool when the heat's on at the next LAN fragfest? The Personal Warm+Cool System can also heat you up using the same principles. Of course, after seeing what happened to the futuristic collar-wearing prisoner who tried to escape in "The Running Man," we're a little leery of such things.

PhatNoise Car Audio System

You know, swapping out the CDs in your car's remote CD changer every eight hours or so can get really old. What you need is a gadget with a longer no-repeat playtime. How does 500 to 1,000 hours grab you? Ease on down, ease on down the road to groovy tunes with the long-awaited PhatNoise Car Audio System ($799 and up). This rockin' unit uses 20GB or 30GB hard drive cartridges ($199 and $299) to store your MP3s and WMAs. It acts like a remote CD changer when connected to compatible car stereos, including some Kenwood and OEM units (check out www.phatnoise.com for compatibility). We've been waiting for this "p-h phat" tune box for a year and a half now, but the limited-edition PhatNoise is finally on sale.

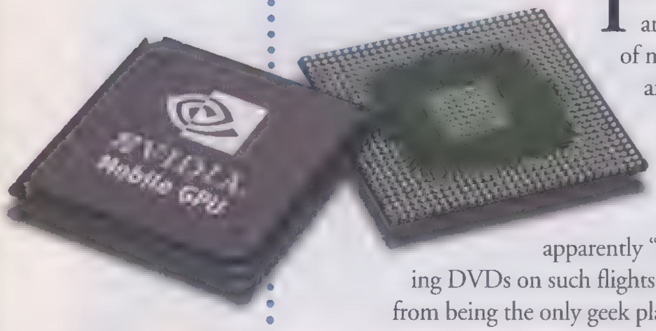


Sony KZ-42TS1 Plasma TV

The trick isn't finding new extreme hardware from Sony. The trick is limiting our choices to just one or two specimens. When our august editor Samit beheld his first Sony KZ-42TS1 widescreen plasma TV at Fall Comdex, he thought he was looking through a window. This 42-inch motivation sapper (the TV, not Samit) uses special image-processing technology to instantly render exquisite 16:9 or 4:3 images from a variety of video sources. It even has built-in TruSurround, SRS 3D audio speakers. Sony says the KZ-42TS1 will be available in January for about $8,000, as will a $6,000 32-inch model (shown). If 42 inches still isn't big enough for your "Evil Dead" trilogy parties, and you have a roomy basement, check out Sony's 60-inch Grand WEGA KF-60DX100 rear projection LCD TV. That's 5 diagonal feet—3.15 million pixels worth—of laser-sharp home theatre wonderment. Like its smaller plasma buddy, this colossus should appear in January for about eight grand. Check www.sonystyle.com closer to the date.

First Look

NVIDIA NV17M



NV17M
Price to be determined
NVIDIA
(408) 486-2000
www.nvidia.com
Preview: No Rating

The first person to write in and take the Mickey out of mobile 3-D gaming gets an all-expenses-paid ticket on a weekday LAX-San Jose commuter flight. It's not uncommon to spot businesspersons, apparently "working hard," watching DVDs on such flights, and these days, I'm far from being the only geek playing Max Payne at 30,000 feet. Being on the go and using a notebook shouldn't limit your ability to play games, which is now actually very possible.

Trust me: It's completely chicken soup; you can play current 3-D games on a mobile PC (Dell and Toshiba both have expensive gaming notebooks), thanks in no small part to advances in mobile 3-D graphics chips. For a year, NVIDIA's GeForce2Go has reigned, with ATI's MOBILITY RADEON being a distant yet decent alternative. Everything else just isn't tennis. Mobile PCs are going to get even faster, thanks to NVIDIA and ATI announcing zippy new graphics chips at COMDEX 2001.

A trip up the 101 freeway prior to COMDEX gave yours truly the chance to take an early peek at NVIDIA's nameless, next-generation mobile part, codenamed NV17M. (The NV17 core is also rumored to be intended for the GeForce2MX successor on the desktop; think GeForce3MX.) The GeForce2Go wasn't perfect. It could have benefited from lower power consumption (better battery life), faster 3-D performance, greater bandwidth, a smaller package, and greater market share.

Check out the psychedelics on this chip. They signify the chip is full of transistors

Improvements. NV17M improves upon GeForce2Go by raising the clock speed from 143MHz to 250MHz, the inclusion of a Vertex Shader engine (not the real Slim Shader), and Quincunx AA capabilities. The on-board NSR (NVIDIA Shader Rasterizer) is capable of up to 11 texture and light operations per clock cycle, single pass multitexturing, and cube environment mapping. 30 million triangles per second and a 1-gigatexel-per-second fill rate are impressive, even by desktop standards. NV17M includes support for 128-bit Lightspeed Memory Architecture (with Zcull, Zclear, and Autoprecharge) for up to 64MB DDR RAM (clocked at 250MHz), as opposed to Geforce2Go's 64-bit package. The 2xx NV17M series will sport 32MB, while the 4xx (the one you want) will harbor 64MB. Memory bandwidth shoots up dramatically from Geforce2Go's 2.4GBps to 8GBps. Mucho groovy.

Performance. Power consumption and voltage has been rugby tackled by shifting from a 0.18-micron to 0.15-micron process. Furthermore, the PowerMizer hardware/software initiative (similar to Intel's SpeedStep) allows for dynamic adjustment of voltage, refresh rates, and GPU clock and can shut down idle GPU blocks for 2-D/3-D functions not in use, thus not sucking up battery life. One demo showed off how the NV17M went from 88fps and 31 watts down to 55fps using only 24 watts (drawing 1.2 amps). Under TLCMark, the GPU's T&L engine helped not only to offload instructions from the CPU but also to lower the voltage from 2V to 1.3V, with a frame rate drop of 50%.

For maximum performance, though, expect to reach 80fps in Quake III at 1,024 x 768 x 32 with Quincunx AA selected. PowerMizer VPE (video processing engine) is also fancy and offloads DVD playback functions from the CPU. Still, it's worth noting that a mobile LCD, power supply, and CPU are the greediest power hogs in notebooks, accounting for 57% of overall consumption, with graphics accounting for just 8%. Enabling PowerMizer won't quite get you through "Apocalypse Now Redux" on one battery, but if you're watching "Planet Of The Apes," you might want to set PowerMizer to Maximum Performance so the battery does run out way before the film ends.

Key move. A critical breakthrough comes in the form of NVIDIA's new MAP (mobile 4X AGP package), which allows for all functions of an AGP card to be rolled into one 31 x 31mm BGA chip. The TV encoder is now internal, and the TMDS is on-die, simplifying designs and integration for OEMs working to fit an NV17M into smaller, lightweight notebook products.

NVIDIA seems to have taken the wishes and critiques of OEMs and end users into account. My hungry gaming appetite is whetted in anticipation of an NV17M-powered P4 1.4GHz notebook, which should be available by March 2002 from Toshiba and Dell. If all those on LAX-SJ Flight 1783 bring their wireless LAN cards, think of the 3-D multiplayer, Quincunx AA enabled, 3-D gaming fun you could have, even in the sky loo. ▲

by Alex "Sharky" Ross

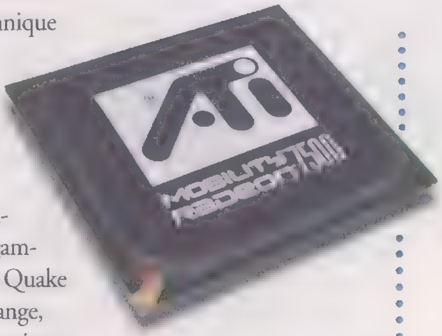
ATI Mobility Radeon 7500

NVIDIA isn't going to have the mobile 3-D chip market to itself. Far from it; the current market share leader is actually ATI. The company is readying its next-gen AGP 4X mobile part, the Mobility Radeon 7500. An impressive feature list includes a 270MHz clock, 128-bit architecture with support for up to 64MB of discrete 210MHz DDR memory (lower-end parts will sport 32MB of on-chip memory), ATI's HydraVision multimonitor software, and integrated TMDS for TFTs.

3-D games will not only run quickly but also look pixel-perfect, thanks to the inclusion of ATI's T&L (ATI calls it TCL), Pixel Tapestry, and Charisma engines. Video Immersion and HyperZ features are also carried over from the desktop version of the Radeon 7500 on to the Mobility part. ATI intends to keep DVD buffs happy with support for ATI's Motion Compensation and iDCT acceleration, helping reduce frame skipping and CPU usage, respectively. Not to be outdone by NVIDIA's PowerMizer, ATI has its own power-and-battery-saving technique called PowerPlay. This nifty feature allows the GPU to dynamically change its operating clock speed from 270MHz at 1.5 volts down to a more conservative 66MHz and 1.2 volts.

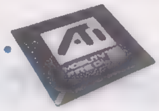
Mobility 7500 should raise the bar similarly to NV17M, which is great news for gamers. Early benchmarks are promising, with Quake III at 1,024 x 768 x 32 in the mid-90fps range, with further improvements expected by the time drivers mature. By late Q1 2002, major notebook OEMs, quirky as they can be, are going to do a lot of head scratching and benchmarking to figure out which chip best suits their needs. Being on time/first is critical in the slow-paced 18-month mobile cycle. Will it be Mobility Radeon 7500 or the NV17M, or will it be another cup of tea? ▲

by Alex "Sharky" Ross



Mobility Radeon 7500
Price to be determined
ATI
(905) 882-2600
www.ati.com
Preview: No Rating

ATI Mobility Fire GL 7800



Mobile 3-D workstation users opting for an "Emperor-like" desktop replacement PC, in terms of price and marketed "performance," would have been, until recently, disappointed. Not only did their "Emperor" notebook have no clothes, but he was also a little chubby. But with NVIDIA's workstation-orientated Quadro brand carrying over to the mobile sector as the Quadro2 Go, mobile PCs not only became powerful enough to substitute as decent gaming systems, but a mobile 3-D workstation sector has also been gathering pace.

3-D gaming requirements focus on high frame rates ("Play-It"), whereas workstation products focus on working with advanced, complex apps that simultaneously run in wire-frame and shaded mode with multiple opening/closing menus and windows ("Create-It"). Outwardly mobile artists and 3-D modelers in need of MCAD, game development, and digital content creation functionality are soon going to have another option thanks to ATI's Mobility Fire GL 7800.

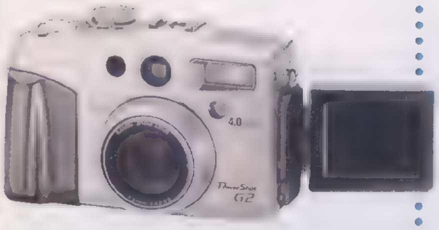
Based on the Mobility Radeon 7500, the clock speed of the Fire GL 7800 is 270MHz, with support for 64MB 128-bit DDR memory. ATI's HydraVision, PowerPlay, Hyper Z, Pixel Tapestry, and Charisma Engine features are naturally all carried over from the mobile 7500. The Mobility Fire GL 7800 is set apart by the inclusion of a high-performance, optimized OpenGL driver with support for 3-D resolutions up to 2,048 x 1,536 x 32. ATI states that the Mobility Fire GL 7800 will be certification-ready for the latest ISV workstation applications for developers to operate popular digital content creation and MCAD programs.

Previously, the notebook was not really a viable 3-D design solution for CAD/CAM applications unless you were working on small assemblies. But with the Fire GL and NVIDIA's Quadro NV17M product (read our preview on page 18), not only can you play 3-D games on a notebook, but developing them there is also a pseudo-reality. Kinda sorta. ▲

by Alex "Sharky" Ross

Mobility Fire GL 7800
Price to be determined
ATI
(905) 882-2600
www.ati.com
Preview: No Rating

Canon PowerShot G2



PowerShot G2
$999
Canon
(800) 652-2666
(714) 438-3000
www.powershot.com
CPU CPU CPU CP

Canon's first 4-megapixel camera, the PowerShot G2, is one of a rare breed of cameras likely to appeal to both experienced and amateur photographers.

It comes with a 32MB CompactFlash card that stores from 14 to 337 JPEG images, depending on quality settings, or 10 TIFF images (RAW image setting). A built-in charger refuels the bundled Li-Ion battery. Both USB and video cables come with the camera. The software package includes Adobe Photoshop 5.0 LE.

A 10-second timer and wireless remote control let you step out from behind the camera. The RemoteCapture software lets you shoot still-life photos by operating the camera's controls from your computer.

This camera has 3X optical and 3.6X digital zoom. Shooting modes include Continuous, Panoramic (achieved with Stitch Assist software), Pan-focus, Portrait, Landscape, Night Scene, Photo Effect, and 15fps Movie. The 1.8-inch LCD flips out and swivels so you can frame photos even when you're in them. There's a built-in microphone for recording movies of up to 2 minutes in length.

The images were some of the sharpest I've seen, and colors were accurate. The white balance remained true to life in Auto Mode, an honor few cameras share. Even the composition of a picture taken in our large warehouse wasn't too dark.

The macro images baffled me; they were blurry in the center and perfectly focused left of center. (You can change Auto Focus to left- or right-of-center, but that feature was turned off for the macro shots.) This oddity is only a problem in macro mode; all other images were outstanding.

It's not often that a camera like this comes across my desk. Usually you have to choose between picture quality and ease of use. The PowerShot G2 has both. You'll be proud of the quality images you take, and you'll also be excited about using this sturdy little camera for casual point-and-shoot pictures. ▲

by Kylee Dickey

FujiFilm FinePix A201

FinePix A201
$249
FujiFilm
(800) 800-3854
www.fujifilm.com
CPU CPU

When I was a youngster, I always dreamed of having a vicious older brother. I figured the frequent mauling at his hands would eventually make me big and tough. Instead, I had an older sister, and by the age of 10, I was routinely beating up on her. The FinePix A201 is the A101's wussy older sister; that is, it may be a little fancier looking, but it ain't got much on the little brother.

What the A201 does have is this: A decent 2-megapixel CCD that produces 1,600 x 1,200 photos, a fixed-focus 36mm (equivalent to 35mm on a film camera) lens, and 2.5X digital zoom. It also comes with a substantial 16MB SmartMedia flash card and has movie and PC cam functions to let you perform Web videoconferencing. For a sub-$300 camera, these specs are nice, but I found the A201 a bit feature-starved.

For instance, the only manual settings you can change here are white balance and exposure compensation. And on the A201, these feel more like crutches for the lackluster Auto mode. In Auto mode, indoor shots under fluorescent lighting were underexposed; photos were better after I forced the flash to shut off.

Outdoor photos were far better, with bright, well-saturated colors and little distortion. Macro mode photos had more consistent hues than I saw with the A101; however, I still found myself screwing around with the EV settings and even flash modes to get more accurate colors. Folks who think they're paying for a camera with true point-and-shoot ease will be disappointed with the A201's Auto mode stills.

What I mean to say is that inexpensive Fuji cameras are fine, but you gain very little in photo-printing power by spending more on the A201. Opt instead for its cool little brother. ▲

by Nathan Chandler

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Sony CPD-G520

Sony's CPD-G520 is a colossal 67.4-pound monitor that stands in stark contrast to the tiny electronics on the other end of the Sony size scale. The monitor's 21-inch FD Trinitron screen provides 19.8 viewable inches, leaving lots of room for gamers and graphics pros, but Sony didn't meet its highest standards with this one.

Our lab techs easily hooked up the monitor using one of its two D-sub HD15 input connectors. I ran diagnostic tests three times using different resolutions: 1,024 x 768 (our usual testing resolution) at 75Hz; 1,280 x 1,024 (Sony's lowest recommended resolution) at 85Hz; and 2,048 x 1,536 (the maximum) at 75Hz. All three resolutions yielded nearly identical results.

The monitor has three Picture Effect settings: Professional, Dynamic, and Standard; Dynamic seemed best for most tests. Diagnostics revealed some moiré during resolution tests; the monitor's included Degauss feature solved the problem, and I didn't need to make further adjustments.

The monitor performed below average during video bandwidth brightness and white-level regulation tests, where the thinnest lines were gray instead of their intended black or white. These results were surprising given the monitor's low 0.24mm aperture grille pitch. Most color combinations were good, but green/magenta and green/white had fuzzy edges.

On the upside, there were no noticeable defocusing effects, and the grayscale screens looked perfect. Color scales were vibrant (8 on a scale of 1 to 10), and the intensity level ramps showed an even distribution of light to dark.

The CPD-G520's strong suit is its rendering of detailed images. It brought out the full depth and richness in our gilded cathedral and showed off every detail of pastoral scenes with excellent realism. However, given the monitor's imperfections, I'd be wary of spending $799. ▲

by Cal Clinchard

CPD-G520
$799
Sony Electronics
(800) 571-7669
(201) 930-1000
www.sony.com/displays

CPU CPU CP

Compaq P1220

The P1220 is among the latest round of high-end CRT monitors from Compaq. I tested its inexpensive sibling, the P920, about the same time I looked at the P1220 and found little to distinguish the two in terms of image quality. Both monitors provide remarkable imaging capabilities, razor-sharp text, and reasonable price tags.

Both monitors offer comprehensive OSDs that include a handful of additional controls most other monitors don't, both have a maximum 1,920 x 1,440 resolution, and both are compatible with a wide range of graphics controllers. The P1220 is the higher performing model of the two, and it costs $400 more than the P920.

Unlike the P920, the P1220 comes with dual video inputs (two 15-pin D-subs); a built-in USB hub (one upstream and three downstream ports); and zoom, convergence, and individual color controls. The P1220 also has a 155W maximum power rating (higher than the P920's 120W) and a 340MHz maximum pixel clock frequency (higher than the P920's 300MHz). Take a good look at the spec sheets for both monitors, as there are more differences than these.

I tested the P1220 on an IBM system with a 500MHz Pentium III processor and 128MB of RAM, and the monitor passed the diagnostics brilliantly. The monitor displayed linearity, focus, and resolution test screens with as much precision as I've ever seen on a CRT monitor. And in terms of complex image clarity and color definition, the P1220 is hard to beat. Every color test revealed bright colors in all their richness and glory with no dimness or oversaturation.

The P1220 provides slightly better imaging than the P920 (text, for example, remained unbelievably sharp on the P1220 at sizes smaller than 7 points, no matter what colors I used for text and background), but in practical use there's little imaging difference between the two. Real professionals will likely opt for the greater range of features the P1220 offers, while the P920 will probably suffice for home power users. ▲

by Cal Clinchard

P1220
$909
Compaq
(800) 888-0220
(281) 370-0670
www.compaq.com

CPU CPU CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Pioneer DVR-A03

DVR-A03
$649
Pioneer Electronics
(800) 421-1606
(310) 952-2000
www.pioneerelectronics.com

There's a cold battle raging between the DVD Forum and the DVD+RW Alliance over which DVD specifications will achieve world dominance. The DVD Forum backs the DVD-R and DVD-RW formats, while the DVD+RW Alliance favors (surprise, surprise) DVD+RW.

Pioneer's DVR-A03, an internal ATAPI/IDE rerecordable DVD drive, is in the DVD Forum's camp. The first-ever DVD-RW drive, the DVR-A03 can read and write to DVD-R, DVD-RW, CD-R, and CD-RW; it can read DVD-ROM, CD-ROM, Audio CD, and Photo CD.

The DVR-A03 comes with Prassi Software's PrimoDVD (Windows 9x/NT-compatible) for ripping CDs and DVDs; Sonic's MyDVD 2.3 for DVD editing; and CyberLink's DVD player, PowerDVD 3.0 (Windows 9x/2000/NT/Me /XP-compatible). The drive also has a lossless linking scheme for preventing buffer underruns.

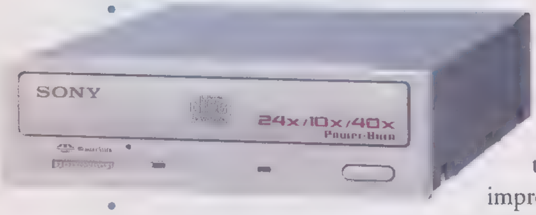
What more could you ask from a DVD burner? That depends. If you're looking for DVD-RAM compatibility for mega-sized data storage, it's not here. If burning home videos onto DVD is your bag, the DVR-A03 is an excellent choice by today's standards. But with recordable DVD, "today's standards" doesn't mean much yet.

The DVR-A03's DVD recording capabilities are slow, with drive ratings at 2X (22.16Mbps) for DVD-R and 1X (11.08Mbps) for DVD-RW. And don't buy it for speedy CD burning; in our tests it took more than 14 minutes to burn 427MB of data to CD-R and CD-RW media.

If you want a DVD burner, but you're playing it safe, you may wait awhile. Both DVD organizations have a heady list of backers. If you decide to buy the DVR-A03, you'll find there's plenty of 4.7GB DVD-R media to choose from, and you can play back the results in any standard DVD player. ▲

by Cal Clinchard

Sony CRX175M/A1



CRX175M/A1
$229
Sony
(800) 352-7669
(408) 432-1600
www.storagebysony.com

If you think a 24X/10X/40X CD-RW with Memory Stick compatibility is exciting, you'll probably love Sony's new CRX175M/A1. In our testing, the drive's burn times were more impressive than its drive ratings, but it earned an above-average rating overall, partly because of its performance in benchmarks and partly because it's the first CD-RW drive to incorporate a Memory Stick slot.

In testing, the drive produced a 9.5X average drive rating, but its maximum speed was 3,599Kbps, or 23.9X. Access times were lackluster, with a 209ms average random-access time (although we clocked random-access times as low as 145ms) and a 330ms average full-stroke access time (the lowest time was 250ms).

When it came to practical testing, the drive performed much better. It took 5:55 to transfer 427MB of data to CD-RW media and a low 4:30 to transfer 427MB of data to CD-R media. The drive also has a 2MB buffer. The drive's CD-ripping capabilities are enhanced by Sony's own Power-Burn technology, which has an excellent reputation for preventing buffer underrun errors.

The coolest thing about this drive is its Memory Stick slot, which lets you transfer music, image, video, and data files from compatible handheld gadgets, digital cameras, and PCs. Memory Stick media is widely available and comes in capacities ranging from 8MB to 128MB.

Instead of the standard fare from Roxio, Sony included a unique software bundle with this drive. There are B's Clip and Recorder Gold, for drag-and-drop file copying and making customizable backups, respectively. The bundle also includes ArcSoft's PhotoBase, PhotoStudio 2000, and VideoImpression and MusicMatch Jukebox. The CRX175M/A1 is no powerhouse, but its fast burn speeds and all its bells and whistles make it a worthwhile (and inexpensive) purchase. ▲

by Cal Clinchard

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Western Digital Caviar WD1200BB 120GB

After playing possum while its rivals pushed hard drives to then-incredible 72GB capacities, Western Digital is behaving rather aggressively. Pounding out 7,200rpm 80GB and 100GB drives in short order, it has now tossed a 7,200rpm 120GB beast into the melee.

This three-platter, ATA/100 beauty packs a 2MB cache buffer. I mention this because WD recently added a Special Edition model to its 100GB WD1000BB line of drives with an 8MB cache. I can't think of any reason why there might not also be an SE variation of the WD1200BB by the time you read this.

We test EIDE hard drives in a PC with a 600MHz Pentium III-EB processor, a SOYO SY-6BA+100 motherboard, and a 133MHz frontside bus speed. Our test system also has 128MB of SDRAM, a HighPoint DMA/100 hard drive controller, and Windows Me.

Awesome read rates in HD Tach 2.61 jump out first from our test results. This Caviar averages 40.2MBps and maxes out at a terrific 49.3MBps in this benchmark. Its 23.5MBps average and 32MBps maximum write rates predictably resemble the WD1000BB's results. We have just a few WinBench results from other EIDE drives against which to compare this Caviar's scores, but we can tell you that its 6,310KBps WinMark99 Business Disk and 22,300KBps High-End Disk scores fall just a little behind the 8MB cache-enhanced WD1000BB-SE's. A 13.3ms random-access time puts the icing on an attractive cake.

The WD1200BB has a somewhat low 200G, 2ms nonoperating shock tolerance. Of course, with its size and speed, I'm not going to dis it for being a little more fragile than other drives. This is a great drive, and it costs less than I would have guessed. It has a 3-year warranty. ▲

by Marty Sems

Caviar WD1200BB 120GB
$299
Western Digital
(800) 275-4932
(949) 932-5000
www.westerndigital.com

CPU CPU CPU CPU

Maxtor Atlas 10K III 73.4GB

The Atlas name used to invoke fear among Quantum's rivals, at least until Maxtor bought the company out. But just because Maxtor's name is on the latest Atlas Ultra320/m SCSI hard drive doesn't mean the intimidation effect is any less.

The Atlas 10K III is, of course, a 10,000rpm drive available with either 68-pin Wide or 80-pin SCA-2 connectors. The model I received had a 73.4GB capacity, so I naturally put its scores next to my results from the 10,000rpm Seagate Cheetah 73LP 73.4GB for comparison. The Cheetah 73LP had a slight advantage, as it was tested with Win98 SE while the Atlas was subjected to WinMe. I don't have WinBench99 scores from the Cheetah 73LP, either, but I do have its HD Tach 2.61 results.

Using a 600MHz PIII-EB with a 133MHz system bus, a Soyo SY-6BA+100 motherboard, and an Adaptec U160 controller, this Atlas lived up to the hype. Its 7.6ms random access time fit in with its 4.5ms advertised average seek time, and its 4,600KBps High-End Disk and 25,100KBps Business Disk WinBench99 scores were very impressive. The Atlas' 41.2MBps and 30.3MBps average read and write scores trailed the Cheetah 73LP's slightly, but its maximum scores won the match with 59.7MBps (reading) and 40.9MBps (writing). Note that an Ultra320/m SCSI card and a faster version of Windows would have likely yielded somewhat better results.

This Atlas relies on a big 8MB cache, just like the Cheetah X15-36LP, but twice the size of the Cheetah 73LP's I reviewed. It's also as quiet as it is quick, at least in the lower capacities. Its 18GB version has a 31dB idle rating, while this 73.4GB model's idle rating is 36dB.

Maxtor no longer tracks MTBF, but says this drive's AFR (annualized failure rate) is less than 1%. The drive has a 5-year warranty. Good drive, this. ▲

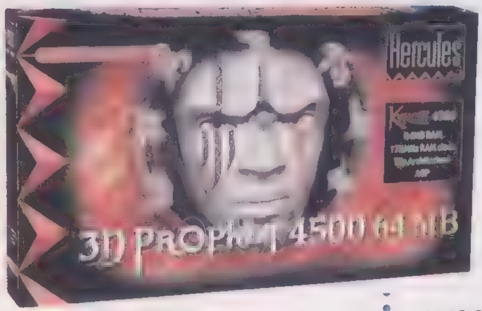
by Marty Sems

Atlas 10K III 73.4GB
$1,159.95
Maxtor
(800) 262-9867
(408) 432-1700
www.maxtor.com

CPU CPU CPU C

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Guillemot Hercules 3D Prophet 4500 64MB



3D Prophet 4500 64MB
$99.99
Guillemot
(877) 484-5536
(514) 279-9960
www.hercules.com

CPU CP

If you want a video card with which you can rip through 3-D shooters faster than a rottweiler can rip up a postman, be prepared to spend $350. Many users don't want to spend that much for better graphics, so Hercules released a card for gamers on a budget: the 3D Prophet 4500 64MB. It may be better than a GeForce2 MX card, but I wasn't impressed with it overall.

The 4500 uses a Kyro II chipset to shave a few dollars. This video card uses 64MB of SDRAM rather than the more popular DDR-SDRAM. It has a decent 300MHz RAMDAC and a maximum 32-bit color depth. The 4500's maximum resolution is 1,920 x 1,440. Refresh rates are from 75Hz to 120Hz, which is a pretty small range. The 3D Prophet 4500 64MB is compatible with DirectX and OpenGL, of course, and works with Win9x/NT 4.0/Me/2000/XP.

Our labs tried to run SYSmark2001 using the card, and the benchmark crashed repeatedly. We made sure we were using the latest drivers and contacted technical support, but we were not able to resolve the problem. The 3DMark2001 test results show that this card isn't a 3-D firecracker, with a total score of only 1,216. But this card is an alternative to a GeForceMX card and not a RADEON 8500 or GeForce3 Ti 500.

When I fired up Quake III, the 4500 redeemed itself somewhat. It runs fine at lower resolutions; at 800 x 600, the card posted a frame rate of 73.2fps. The frame rate at 1,024 x 768 was 70.8fps, which is pretty good. But at 1,600 x 1,200, the frame rate dropped to only 45.9.

The 3D Prophet 4500 64MB has decent 3-D performance, but for $50 more, you can buy a Hercules 3D Prophet II Titanium and get better 3-D performance, especially at higher resolutions. The problems we had with the SYSmark-2001 test also raise a red flag. I'd rather spend a little more and get a better card. ▲

by Michael Sweet

Matrox Millennium G550 Dual-DVI

Millennium G550 Dual-DVI
$199
Matrox
(800) 361-1408
(514) 822-6000
www.matrox.com

CPU CPU CP

Matrox's video cards are popular with small businesses and home users because they consistently deliver excellent 2-D acceleration and are affordable. Matrox's Millennium G550 Dual-DVI video card will appeal to a more select group: users who work with two flat-panel displays.

The Millennium G550 Dual-DVI is an AGP card that uses the Millennium G550 chipset. The card has 32MB of DDR-SDRAM and a slightly faster than average 360MHz RAMDAC. The Millennium G550 Dual-DVI's maximum resolution is 2,048 x 1,536, with refresh rates from 85Hz to 200Hz.

The Millennium G550 Dual-DVI includes an adapter for connecting two flat-panel displays to the card. I tried out this feature and liked it very much. It's easy to work with both displays, and many business users can certainly benefit from having an extra monitor at their disposal.

The strength of Matrox's video cards is always its 2-D acceleration, and the Millennium G550 Dual-DVI proved to be a solid 2-D card in our SYSmark2001 test. Its overall score of 67 is as good or better than powerful 3-D cards that cost almost twice as much. The Office Productivity score was 59, and the Content Creation score was 77, both solid scores.

The Millennium G550 Dual-DVI didn't do well in our 3-D benchmarks, but it's not designed to be a 3-D card, so this isn't surprising. The video card's frame rates in our Quake III test weren't impressive. At a resolution of 800 x 600, the frame rate was 48fps. At 1,024 x 768, the frame rate dipped to 39.3. The 3DMark2001 score of 899 is the lowest I've seen, but again this card isn't designed for 3-D applications, so I'm not particularly disappointed by this score.

The Millennium G550 Dual-DVI is a niche product. If you need a good video card, there are plenty of products that offer comparable 2-D performance and much better 3-D performance. This card is for users who have two flat-panel displays and need solid 2-D performance. ▲

by Michael Sweet

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Samsung SPH-I300

Samsung's SPH-I300 successfully walks the line between being a PDA and being a cell phone. Although the unit most closely resembles a PDA, it's not too bulky as a cell phone.

The smaller size—measuring 4.9 inches high x 2.28 inches wide x 0.82 inches deep and weighing 6 ounces—means a slightly smaller display. In addition, colors looked washed out and the TFT display is tough to use outdoors. The display does double as a virtual keypad, which eliminates the need for a physical keypad. However, it's impossible to dial without looking at the keypad (not that anyone actually dials while driving or anything). Voice-activated dialing helps, but it's limited to 20 numbers and only works in digital service areas.

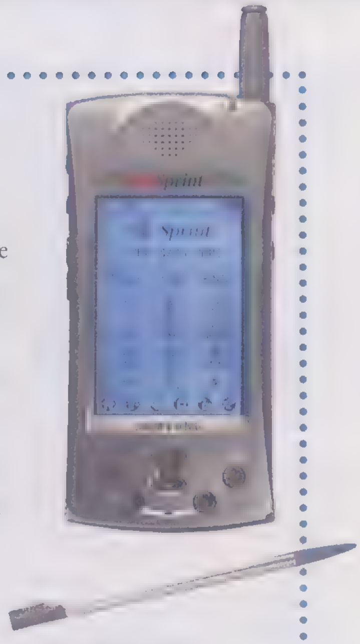
The SPH-I300 runs any Palm OS-compatible Internet application. Connection speeds are slow at 9,600Kbps, but it's a treat to be able to check your e-mail while stuck in traffic or IM friends from a ballgame. Also, the touch screen display and ability to enter data using Graffiti provides for a much better interface to the wireless Web.

The SPH-I300 I tested had some stability problems. The phone's software crashed three times in the 4 weeks I used the phone. One crash required a hard reset, which deleted all my data.

Two batteries are included. Samsung says battery life is approximately 120 minutes of talk time or 18 hours of standby time. Battery life can vary dramatically. For example, prolonged use in analog service areas can reduce battery life.

Despite a lackluster display and the stability problems, the SPH-I300 remains highly functional as both a PDA and a cell phone. The interface and ability to enter data using Graffiti vastly improves the wireless Web and messaging applications by making it easier to view and enter data. The phone currently sells through Sprint PCS. ▲

by Chad Denton



SPH-I300
Samsung
$499
(888) 253-1315
www.sprintpcs.com
CPU CPU CPU

Handspring Visor Neo

Handspring's Visor Neo may finally put the original Visor and Visor Deluxe to bed. The Neo resembles the original Visors, as well as the Visor Platinum, in size and shape but comes in smoke, red, and blue.

The 33MHz Dragonball processor in the Visor Neo is identical to the one in the Visor Platinum but is twice as fast as the processor in the original Visors. Aside from colors, the Neo only varies from the Platinum in that the Neo's OS is more up to date.

The latest version of Handspring's modified Palm OS (version 3.5.2H3) adds some minor features. The most striking addition is Fast Lookup in the Address Book application, which lets you use the Neo's hardware buttons to sort through and pull up contact information without using a stylus to tap on the display. Contact information is the data I want to quickly retrieve most often. Not having to pull out a stylus when I want to retrieve it is nice. Unlike the Visor Pro and Visor Edge, the Neo doesn't have support for silent alarms because it doesn't have a flashing LED.

The Neo features 8MB of RAM. Most Palm OS devices (save Handspring's Visor Pro, which has 16MB of RAM) have a maximum of 8MB of RAM. Unlike the Visor Pro, the Neo uses two AAA batteries. Frequent travelers find alkaline batteries convenient because they're readily available everywhere.

Overall, the Neo doesn't offer much more than a few minor upgrades and a new skin. Still, the device is the same price as the Visor Platinum, so you might as well opt for the latest software. The Visor Deluxe is still available for $70 less than the Neo, but I feel the Neo is the best sub-$200 Visor available. ▲

by Chad Denton

Visor Neo
$199
Handspring
(888) 565-9393
(650) 230-5000
www.handspring.com
CPU CPU C

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Minolta-QMS Magicolor 6110

Magicolor 6110
$4,499
Minolta-QMS
(800) 523-2696
(334) 633-4300
www.minolta-qms.com
CPU CPU CPU C

With a 200MHz processor and 256MB of installed RAM (384MB max), this is a color laser printer of monumental proportions. At at a whopping 101 pounds, you won't be taking this printer to show-and-tell.

Parallel and serial ports are available, and the 6110 supports an Ethernet connection. Minolta-QMS has marked the 6110 at 24ppm/6ipm (images per minute). For such a large printer (16.5 inches high x 24.2 inches wide x 21.3 inches deep), it's odd the 6110 only comes with a 250-sheet capacity (500-sheet tray optional).

The 6110's documentation was limited and scattered between books. Also, the installation was anything but smooth. I had to specify the printer and find the driver on the CD. Most printers I've seen have a much simpler setup.

At 300dpi (the lowest setting), the first page appeared in 0:20 (minutes:seconds). The rest of our 10-page text file averaged about 12.8ppm. When we bumped the resolution up to 1,200dpi and added graphics to a text file, the first page took 0:43 to print, and the entire document averaged 6.7ppm. PowerPoint slides averaged 7.4ppm, and a high-resolution color JPEG file printed at 1.5ppm.

At 300dpi, the fonts were a bit stair-stepped, but at 1,200dpi, the text quality was excellent. Fonts were bold with extremely smooth edges and easy to read in a wide range of font sizes. Graphics had vibrant colors, but most impressive was high-resolution graphics having no banding. Images were a little grainy, but depending on your needs, you may forgive this shortcoming because it's so rare to see a laser printer that produces prints without banding.

Overall, the Magicolor 6110 produced some of the best-quality printouts I've seen. Of course, at such a steep price, you would expect high quality. If you have the money to spend and need to print both quality text *and* graphics, this printer is quite a catch. You may not be able to lug this 101-pound beast around, but you'll certainly have some impressive printouts for show-and-tell. ▲

by Kylee Dickey

Ambicom Wave2Net 802.11b Access Point

Wave2Net 802.11b Access Point WL1100B-AP
$160
Ambicom
(510) 249-0581
www.ambicom.com
CPU CPU CPU

If it's time for an encrypted wireless network, Ambicom should be among the vendors you consider. The Ambicom Wave2Net 802.11b Access Point supports WEP and RC4 encryption standards. You may be flinging data through the air, but you certainly don't want your doofus neighbor catching any of it.

The WiFi-compliant Wave2Net WL1100B-AP costs $160 by itself, while the wireless WL1100B-PC Type II PC card we used to test sells separately for about $78.

We connected the wall-mountable Access Point to an IBM ThinkPad R30 with a 1GHz Pentium III, 120MB of RAM, and Windows 2000 Professional through a CAT5e cable and an included USB setup cable. Next, we installed the 802.11b PC Card in a Winbook Si with an 850MHz PIII, 128MB of RAM, and Windows Me. After some setup, we got the Access Point communicating with the Winbook and another IBM ThinkPad with a built-in 802.11b antenna (800MHz PIII Mobile, 128MB, Win2000 Pro).

Next, we made life difficult for the Wave2Net by mounting it only 4 feet off the ground. We timed 2MB, 10MB, 25MB, and 50MB file transfers and recorded maximum transfer rates between 1.28Mbps and 1.36Mbps.

Continuing our torture test, we walked to different parts of the building, making sure servers, machinery, and steel structural beams were between the access point and our notebooks. Even in this harsh test, the Wave2Net still retained about half its speed at more than 160 feet (and probably longer but we ran out of building.) The Wave2Net's maximum range is approximately 492 feet indoors and 1,640 feet outdoors. It works with Windows 95/98/Me /2000 and has a 1-year warranty. ▲

by Marty Sems

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Sound Blaster® Audigy™ is the best Dolby® Digital 5.1 sound card with 24-bit multi-channel performance and 100dB Signal to Noise Ratio for audio clarity beyond compare. Capable of 4x more effects processing, the Audigy™ chip drives EAX® ADVANCED HD™ to deliver ultra-realistic 3D audio effects in games, and the richest audio playback with advanced music enhancement tools like Audio Clean-Up in PlayCenter™ 3. With an integrated SB1394™ port, you can easily connect IEEE® 1394 compliant DV Camcorders, storage devices, another Audigy™ card, and more. And with ASIO™ support, you can compose professional quality music in the comfort of your own home.

Sound Blaster® Audigy™ Platinum eX with external Audigy™ drive

For the producer in you, Sound Blaster® Audigy™ Platinum eX has over 15 applications, including professional audio creation tools, and features the external Audigy™ drive with extensive connectivity to analog or digital devices like home-stereo receivers, Optical DATs, MIDI, and SB1394™ devices. Preview the entire Sound Blaster® Audigy™ family at **www.soundblaster.com**.

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Canon MultiPass F50

MultiPass F50
$499
Canon
(800) 652-2666
www.usa.canon.com/consumer
CPU CPU CPU CPU

Seen one multifunction device and you've seen them all, right? Most have the same multifunctions and try to impress you with sleek designs. Ultimately, looks aren't important—results are. That's why Canon's MultiPass F50 impresses me: It looks good (if you care), but it performs better.

The MultiPass F50 is big—27 pounds—so you'll need to clear some room for this unit, but it's so quiet you may forget it's there. During testing, there were times when I had to check on it just to make sure it was actually printing. And printing it was; it zipped through our timed tests.

A 10-page document printed in 1:33 (minutes:seconds), or 6.45ppm. A six-page text and graphics file and three-page PowerPoint slide file finished in 4:21 and 1:21, respectively. The text was clean and dark, and graphics didn't show any banding. My only (minor) complaint is that while the PowerPoint graphics looked laser quality, an illustration of three people had light orange and pink flesh tones.

With a fax resolution of 203 x 98 (200 x 200 for color), faxes were dark and legible. Copied and scanned documents looked like the originals with resolutions of 600 x 600 and 600 x 1,200, respectively. There's a built-in 30-page automatic document feeder (paper capacity is 100 sheets). There are also individual ink tanks, which saves you from replacing an entire expensive color ink cartridge.

But what really impressed me was the MultiPass F50 printed a high-resolution graphic in only 1:58 on plain paper and 3:08 on photo paper. Yes, that's 3 minutes and 8 seconds, which is incredible considering how detailed the photo is. Each print looked comparable to the original. If I have to nitpick, I'd say the plain paper curled when printing. Other than that, the results were jaw dropping.

At $499, the MultiPass F50 may seem expensive, but considering my complaints were minor and the printer passed our tests with flying colors, I'd say this MFD is worth its price tag. ▲

by Catherine Geistkemper

HP Photosmart 1115

Photosmart 1115
$199
Hewlett-Packard
(800) 613-2222
(650) 857-1501
www.hp.com
CPU

Photo printers these days often come with nice, but somewhat gimmicky, features. As a trade-off, they may neglect their first priority—creating great photos. Such is the case with HP's Photosmart 1115.

The $199 1115 implements HP's PhotoREt III interpolation technology and 2,400 x 1,200 resolution (on photo paper). It's rated at 12ppm and 10ppm in black ink and color, respectively. As with HP's other Photosmart inkjets, this one prints with or without a PC via a CompactFlash and SmartMedia card slot.

A one-page font test flashed some of the smoothest characters I've seen from an inkjet and featured smooth ink coverage, too. Rough-draft text was so-so. A 10-page file printed at 7.8ppm and revealed a few smeared characters hiding under the 1115's skirt. For a photo printer, though, this text was more than adequate.

My text/graphics combination file printed at 2.8ppm and had accurate, smooth coloring and better text, and the 1115 also nailed more difficult shades of purple that other inkjets, such as the Canon S630, struggle to paint accurately. However, there were white flecks that blemished solid black spots.

Appropriately, the moment of truth came during the photo-printing workout. Full-page photos on glossy printed at maximum resolution were done in about 11 minutes. Plain-paper prints were done under four minutes. Both times are acceptable for 8.5- x 11-inch photos.

But my problem with the 1115 isn't speed but the low-quality photos that it produced. It's not that colors weren't brilliant, because they were. Eye-scalding, pupil-popping brilliant. Purples, yellows, and oranges were all vivid, but darker tones were simply flooded in ink. Red and crimson were so oversaturated that critical details got lost in the mush.

The 1115 could have been a standout photo printer. It's not overloaded with trivial features, and it's not overly expensive. But if it's outstanding photos you want, you'll have to look elsewhere. ▲

by Nathan Chandler

CPU Ranking: 0 = Absolutely Worthless CPU CPU CPU 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Epson Perfection 2450 PHOTO

The Epson Perfection 2450 PHOTO scanner has a lot to live up to. After all, the previously released 1650 PHOTO and 1250 PHOTO are both top-notch units in Epson's Perfection line. The 2450 PHOTO holds its own—once you get past its size.

At 4.8 inches high x 11.79 inches wide x 18.84 inches deep, this flatbed is bigger than most others. Still, it's pretty sleek. The lid adjusts to scan bulkier items; there's also a built-in transparency adapter, which is easy to use. Scans were sharp with bright, bold color and detail.

With a USB or IEEE 1394 interface, the scanner has a 2,400 x 4,800dpi resolution and 48-bit color depth capabilities. Scan times at 600dpi were very good, with a black-and-white photo taking 0:24 (minutes: seconds) and color photos ranging from 0:34 to 1:28. All the scans looked comparable to the originals. Flesh tones looked natural, colors were eye popping, and there was good detail in contrast and shading both in color and black-and-white scans. The 2450 PHOTO met our grayscale benchmark of 27 shades and text scanned clean with good ink coverage. When our lab techs pushed the scanner to 2,400dpi, however, the scan times stre-ee-etched from 8:39 for the same black-and-white photo to 34:32 for a detailed color photo.

The 2450 PHOTO has easy-to-adjust settings for exposure, gamma, highlight, shadow, and curves, although I didn't need to adjust much. A button on the front of the scanner lets you open the Smart Panel software, which lets you select such functions as copy, photo print, or scan to e-mail.

This is a great $399 scanner, but if you're short on desk space, you might want to go with a scanner that's more compact. ▲

by Catherine Geistkemper

Perfection 2450 PHOTO
$399
Epson
(800) 873-7766
(562) 981-3840
www.epson.com

CPU CPU CPU

Lightware LS-8

So, you thought it might be cool to buy a digital projector, hook up your DVD player and sound system, turn off the basement lights, and pretend you're in your very own theater. But then you started browsing online retailers' Web sites. What you discovered sent you into sticker shock: $8,000 for a stinkin' projector? All right, calm down, you don't have to apply for a new credit card just yet to get some pseudo-big-screen projector action. Lightware offers its LS-8 projector for a consumer-friendlier $1,795.

What's the catch? Well, although the LS-8 offers XGA (1,024 x 768) compatibility, its native resolution is SVGA (800 x 600). This makes for a projected display that will look nice and sharp with standard video and SVGA input but won't look as sharp as possible with larger input resolutions. Additionally, the LS-8's 800 ANSI lumens is doable, but it isn't as bright as high-performance models that offer 3,000 lumens or more.

The LS-8 uses Texas Instruments' DLP (Digital Light Processing) technology. In projectors, DLP isn't any better or worse than LCD, but DLP has a better reputation for home theater applications. And if you haven't entered the DVD age, you can even hook up your VCR.

The LS-8 just won't stack up to the best of what Lightware has to offer, and it isn't meant to. Businesspeople and educators on a budget will find that the LS-8 is affordable, and its sturdy, stylish case looks are as good as many of those projectors that sell for upward of $5,000.

The LS-8 also provides keystone correction, a 1-watt speaker that sounds a lot better than I expected, an infrared remote control with USB mouse control and a trigger left-clicker, and a 200-inch (diagonal) maximum projected image. ▲

by Cal Clinchard

LS-8
$1,795
Lightware
(800) 211-9001
(503) 641-7873
www.lightware.com

CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

AMD Duron 1.2GHz vs. Intel Celeron 1.2GHz

Duron 1.2GHz

$100
AMD
(408) 749-3060
(800) 538-8450
www.amd.com

CPU CPU CPU

Photo courtesy of Intel

Celeron 1.2GHz

$130
Intel
(408) 765-8080
(800) 628-8686
intel.com

CPU CPU CP

In terms of bleeding-edge performance, the Duron vs. Celeron bout has never been in the heavyweight class. The Don King electric PR frizz is AWOL, creating lower-profile PR sparring. But this fight is no less important in terms of market share, that's for sure. The value business sector sales far outweigh our beloved enthusiast performance market, and that's also where the real money is made. With the release of Athlon XP, it's easy to forget that AMD also caters to the value (both business and consumer) sector with Duron steppings. The latest is the Duron 1.2GHz, upping the previous Duron 1.1GHz by 100MHz.

The players. So in the green corner is AMD's new challenger, weighing in at 0.18-micron, sporting the Morgan core, with 64KB of L2 cache trim and green pants (I made that bit up), the 1.2GHz Duron. Running at 1.75 volts, the Duron 1.2GHz is socket 462-based with a 12x multiplier and 100MHz frontside bus, which has support for PC-133 SDRAM or 2100 DDR RAM platforms. In the blue corner, weighing in at 0.13-micron, sporting the Tualatin core, with 256KB of L2 cache, is Intel's Celeron 1.2GHz (out for a while now).

Morgan is a stripped-down version of the Athlon XP Palomino core. The major difference is in the size of the L2 cache. Morgan comes with 64KB as opposed to the 256KB on Palomino. Unlike the Athlon XP, the Morgan-based Duron is still packaged with an older CPGA (Ceramic Pin Grid Array) ceramic case. The Morgan core improves upon the previous Spitfire core (used on sub-1GHz Durons), lowering power consumption by 20% and adding data prefetch and 3DNow! Professional instructions, making the new Duron SSE-compliant.

Performance. Benchmarking both contestants under WinXP Pro, with 256MB and a GeForce3, the winner was crystal clear. The Duron 1.2GHz sweeps in Quake III, SYSmark2001 (a close call), and 3DMark2001. The winning scores don't touch an Athlon XP 1900+ or Pentium 4 2GHz, but obviously these budget CPUs, aimed at the corporate space, are not supposed to. Nevertheless, it's reassuring that you can play games respectably on a Duron 1.2GHz.

Overclockers should be content with either CPU. By joining the L1 bridges via a pencil, the Duron 1.2GHz bounced up to 1.35GHz, an extra 135MHz. By increasing the voltage and utilizing more eccentric cooling techniques, it could likely go higher. The Intel Celeron 1.2GHz actually becomes more attractive than its Duron counterpart with overclocking in mind. The Celeron's 100MHz FSB needs to be upped to 125MHz, which really allows the Celeron to party at around the 1.5GHz mark (thanks to its 0.13-micron core). This implies that, should Intel ship 133MHz FSB Celerons, they would be far better equipped to duke it out with Durons.

Duron & Celeron Benchmarks

AMD's Duron clearly beats the Celeron in our benchmarks, run on a WinXP Pro WinXP Pro with 256MB and a GeForce3.

WinXP Pro	Duron 1.2 GHz	Celeron 1.2GHz
Quake III	167.2	141.4
3DMark2001	5920	5470
SYSmark2001	131*	129

*with AMDPatch

Is it the name? Despite the Duron outperforming the Celeron, the corporate space still seems to pass over AMD's chip, whether because of historical stability concerns, lack of brand recognition, misinformation, or perhaps just benign neglect. In the OEM sector, where most Celerons are sold, performance doesn't seem to be the priority. The Intel name seems to be what matters, so clearly AMD has its corporate back against a wall, albeit with a better performing CPU and at a more attractive price. Intel's marketing department wins again as the company does have a slightly wider spectrum differential between their high-end Pentium 4 part and their lower-end Celeron part. The difference in the performance delta between the Duron and Athlon is much less, as is the difference in price.

Final word. If you read this magazine, chances are you're an enthusiast (just like yours truly), and hence the processor is not a place to be cost-cutting. Still, the performance lead in the value sector goes to AMD's Duron 1.2GHz, and although neither processor particularly floats my boat, I find the Celeron 1.2GHz less buoyant. As an enthusiast, you are going to need a bigger boat (hence the relatively mediocre ratings), and I urge you to find a way to spend the extra cash on a pricier Athlon XP for its superior performance. For those who can't, choosing the Duron 1.2GHz over Celeron 1.2GHz is a better bang for the buck, as it's cheaper. Better still: Sit on the fence until AMD's die-shrunk 0.13-micron Appaloosa core is released in mid/late Q1 2002, according to AMD's latest roadmap, rumored to be entering at the 1.5GHz level. I might sail in one of those. . . . ▲

by Alex "Sharky" Ross

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Anand Lal Shimpi

The Console Wars Get Technical

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, *CBS' 48 Hours and* Fortune. *His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

Gamers are usually the easiest to sell hardware to; a manufacturer can sit back and show games running faster or looking better on more expensive hardware. This is contrary to selling hardware to most home users, where it's difficult to quantify exactly how much of a benefit you'll get out of a faster CPU or a more powerful video card. With that said, it's not a surprise that the latest round of next-generation video game consoles are even more robust than ever and in doing so, they actually borrow a few pages from the PC hardware industry.

First we have the Microsoft Xbox. The brains and brawn behind Microsoft's first entry into the console market is a modified version of the PC's nForce chipset (for more information on nForce, visit AnandTech). For those of you that are familiar with the nForce platform, the modifications are as follows:

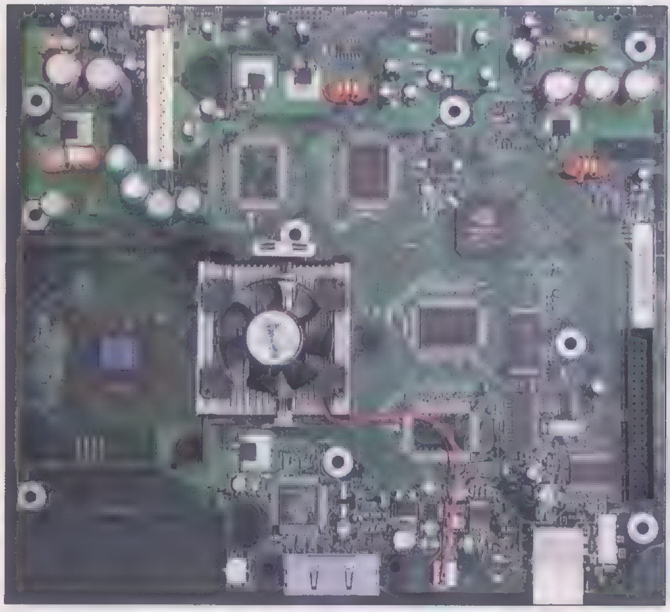
1) The EV6 FSB used on the Athlon-compatible PC nForce has been replaced with a slower 133MHz FSB that works with Intel's AGTL+ bus to communicate with the 733MHz Intel processor housed in the unit (more on that later).
2) The graphics core integrated into the nForce IGP (its North Bridge) is a special design that falls in between the GeForce3 and the GeForce4 graphics cores (NV20 and NV25). This core is known as the NV2A. It features dual vertex shaders and runs at 233MHz; the rest of the feature set is identical to that of the GeForce3.
3) The memory bus runs at 200MHz using DDR SDRAM, offering a whopping 6.4GBps of memory bandwidth. The Xbox motherboard is outfitted with 64MB of DDR SDRAM, although earlier developer boxes featured 128MB.
4) Instead of using nForce's TwinBank memory architecture (2 x 64-bit buses), the Xbox IGP uses the GeForce3's crossbar memory architecture, meaning that there are four independent interleaved 32-bit DDR SDRAM memory controllers that access memory.

The brains and brawn behind Microsoft's first entry into the console market is a modified version of the PC's nForce chipset.

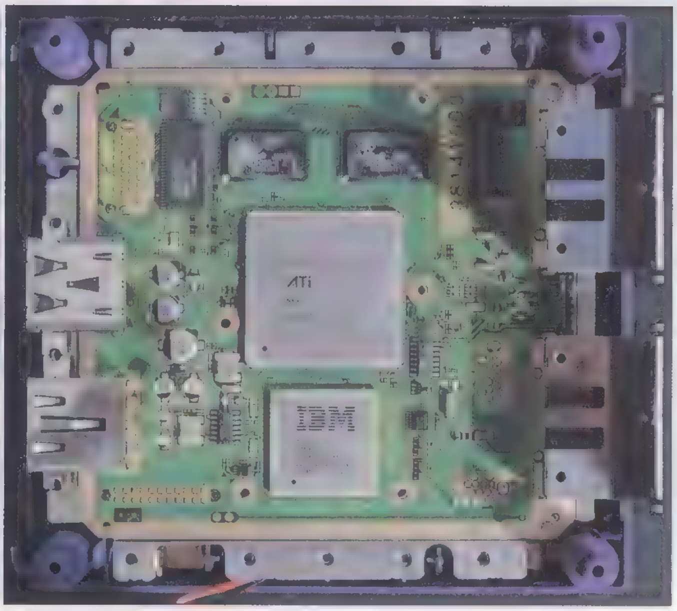
The result of all this is the most powerful gaming console the market has ever seen. Even more importantly for PC users, the fact that developers only have one set of hardware specifications to develop for means that we can expect to see much greater utilization of the programmable pixel and vertex shaders of the NV2A core than we've ever seen on the desktop side. Hopefully this will encourage PC developers to make greater use of these tools that they've had at their disposal for over a year now; either that or hopefully we'll see Xbox games ported to the PC (some are already in the works, such as Halo) that will make use of these features.

Next we have Nintendo's GameCube, an admittedly much different approach than the one Microsoft took. Instead of taking essentially a PC and molding it into a gaming console, Nintendo started with a game console and made it just that. Because of this mentality, you won't find any support for DVD playback or a hard drive in the Game-Cube. The secret to the Cube's success is its efficiency. The GameCube features 40MB of 1T-SRAM as its main memory subsystem; 1T (short for 1 Transistor) SRAM can be considered a hybrid between the conventional 6 transistor SRAM found in most cache and the capacitance based SDRAM found in the Xbox and most PCs. There are a number of trade-offs involved in this approach, but that's beyond the scope of this column. The end result is that although the Cube only has 2.6GBps of memory bandwidth to its main memory, getting there is very efficient and accesses are very low in latency. This 64-bit memory bus runs at 324MHz and although it still doesn't offer more memory bandwidth than the Xbox, there are a few other neat tricks Nintendo pulled to make the GameCube very competitive.

The graphics core behind GameCube was designed by ArtX, who was later acquired by NVIDIA's competitor, ATI. The design ArtX completed just before their acquisition was known as Flipper, and it was this creature that made its way into the GameCube. Flipper is



The Microsoft Xbox motherboard has its roots in the PC world, as it's just slightly larger than a regular ATX motherboard.



The Nintendo GameCube motherboard, on the other hand, is about the size of a DVD (as a point of reference).

architecturally much different than anything ATI has ever produced in that it makes use of embedded DRAM (eDRAM). Embedded DRAM is memory that is actually embedded in the die of the graphics chip itself, offering very high bandwidth memory access to the graphics core. The frame and Z-buffers are stored in this 2MB of eDRAM and run alongside a separate 1MB eDRAM cache for textures. If you know anything about graphics hardware, you'll know that Z-buffer accesses are very memory bandwidth-intensive (the Z-buffer is read from/written to whenever you're determining how far away something is in a scene). Removing this alone from the task of the main memory bus makes that 2.6GBps of memory bandwidth seem like all that much more.

The efficiency trend continues when you look at the die sizes of the Flipper core and the only other processor in the system, the IBM manufactured Gekko core (a Power PC 750 derivate). The Gekko measures less than 50mm^2 at 0.18-micron, and Flipper is just over 100mm^2. For comparison purposes, the Xbox's CPU is closer to the size of Flipper, and the Xbox IGP dwarfs all three chips in its massive size. This, along with the lack of any hard drive, gives Nintendo the ability to price their console at $199 compared to Xbox's $299. At the same time, however, Microsoft is able to offer a hard drive, full-sized DVD drive, and a built-in Ethernet controller for the extra $100.

While both consoles had impressive launches at the end of last year, the initial graphics quality of games seems to be much higher on the Xbox. Titles such as Halo and Dead or Alive 3 are visually much more stunning than any of the GameCube's initial titles. The true winner will, of course, be declared over time, as key sellers such as Mario and Zelda have yet to be seen on Nintendo's new hardware. For more information on both of these consoles, read my article on AnandTech entitled "The Hardware Behind The Consoles" at www.anandtech.com. ■

Anand knows the hard stuff. Give him feedback at anand@cpumag.com.

Infinite Loop

Look Out VHS

Get ready to add VHS tapes to the technology junk heap. DVD sales and rentals are skyrocketing and are poised to overtake VHS in another year or so. Notice the ominous, gap-closing trend in this U.S. forecast:

Sales and rentals of VHS tapes vs. DVDs:

	VHS	DVD
1997	$16.5 billion	$100 million
1998	$18.1 billion	$400 million
1999	$17.7 billion	$1.6 billion
2000	$16.9 billion	$4.2 billion
2001	$14.8 billion	$8.5 billion

Source: InfoTrends (www.infotrends.com)

by Alex "Sharky" Ross

Consoles: Hotter Than Potter

Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently swims in Silicon Valley.

Gaming isn't a matter of life and death in this household nor was it back in my student dorm (with en-suite vomit-sink); it's much more important than that. I've poured my life into gaming, starting with the ZX81, BBC, then the Commodore family, and finally, my string of beloved (and be-cursed) PCs. These machines kept my gaming habit satisfied. I used to laugh off the threat of "toy" consoles, but now I sense a disturbance in the Force. Perhaps it's mid-life crisis forcing me to buy tiny colored boxes with naff handles, but when I'm lining up at the local EB (thinking about being the oldest codger at raves as well), credit card at the ready, gleefully clutching DVD-sized boxes, I see many familiar older faces. Obviously I am not alone.

A slew of essential games has arrived, but with a twist. They are PS2, GameCube, and Xbox **console** titles. The PC scene is now low key, shoved to the periphery of stores. What a shame; my Athlon XP 1900+ beast is begging for action, but until PC games rattle my cage again, I'm putting Quanti-Speed Architecture to other uses. Take me away Jerry, I'm a self-confessed born-again ConsoleKid trapped in an old-school PC gamer's body.

The most technically advanced (and expensive) package is Xbox. The 733MHz Intel Cumine core-based FC-BGA CPU, NVIDIA NV2A (NV20/25 derivative) 233MHz GPU, 8GB hard drive, and Dolby Digital APU represent a $100 loss per unit for Gates' empire. (Small wonder this mini-munchkin pseudo PC debuted bundled with Microsoft games.) But sod it; Halo is the finest first-person shooter I have ever played! I am determined to defeat the Covenant, have forgiven the lack of online multiplayer, and don't miss my mouse. Project Gotham Racing is a stunning arcade racer. For those short in-between gaming sessions, I like to button-mash with the graphically dazzling Dead or Alive 3 and bizarre Oddworld: Munch's Oddysee.

> I sense a disturbance in the Force.

The "hotter than Potter" GameCube is technically second with IBM's 0.18-micron 485MHz "Gekko" processor. The 162MHz "Flipper" GPU provides "faster than lightning" gaming and fancy visuals thanks to an ATI sticker and some joint ArtX engineering. GameCube lacks a hard drive and DVD capabilities, lowering its asking price, but those proprietary mini G-DVDs do contain compelling games. I'm using the force in Star Wars: Rogue Leader and even know who Wedge Antilles is. On the dark side, I can prove that my affinity for extreme sports goes further than winter surfing in Northern California by playing the highly addictive Tony Hawk's Pro Skater 3 and Wave Race: Blue Storm.

PS2's innards are a year older and thus the least advanced, sporting a 300MHz Emotion Engine, 128-bit MIPS processor, and 150MHz Graphics Synthesizer in serious need of anti-aliasing. What the PS2 lacks in hardware, it more than makes up for in titles. Choosing to delay deployment of several showcase games to coincide with Xbox and GameCube releases, Sony is clearly compensating for something. I'm currently snaking through Metal Gear Solid 2 and covertly playing 007 in Agent Under Fire, yet I still find time to burn rubber in Gran Tourismo 3. I haven't even undressed the shrink-wrap off of GTA3 or Fifa 2002.

Alas, next-gen consoles are not Jedis yet! When AI appears senile, and I yearn for multiplayer gaming, the PC is still king. Xbox and PS2 online modem/broadband gaming capabilities are still in the pipeline for 2002 but not here yet, and speaking of pipelines, those two Italian plumbers (Luigi & Mario) are also keeping their exposed GameCube backsides under cover for now. Though RTS/turn-based games (Civilization III) are superb as ever on PC, a gnat-length attention span makes them too laborious for me. Hence I'm left craving action. Aquanox is pretty. Aliens Versus Predator 2 is tip-top and verging on creepy, proving that PCs still have superior technology. Perhaps Return to Castle Wolfenstein will rekindle the flame for PC gaming (though the demo didn't).

Hopefully, when the console money train departs, game developers will flock back to the PC, but for now, my friends and family will see less of me, as surfing (the wet kind), raving (the dance kind) and playing with hardware (easy tiger) are on hiatus until I get through my A-list of console games. By mid-2002 when Doom III and Medal of Honor are out for the PC, I hope to stare at a TFT again; my CPU isn't even lukewarm. ■

Flame me as a PC deserter at sharky@cpumag.com; I'll show you my console finger blisters.

[H]ard Talk

by Kyle Bennett

AthlonXP: Breaking & Entering

Kyle Bennett is editor-in-chief of HardOCP.com (hardocp.com), one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

The purpose of this column is to show you how to unlock the multiplier on the new AthlonXP CPUs, thus allowing you to change the CPU's multiplier. Altering the multiplier can allow you to use higher bus speeds, giving your CPU more bandwidth it can utilize, which is almost always a good thing. Also, unlocking the multiplier will allow you to change the CPU's clock setting very easily. Both these practices are known as "overclocking" and will allow you to squeeze a bit of performance out of your CPU that AMD has left in as a sort of safety buffer zone.

This image shows the L1 bridges you will need to connect with a conductive trace.

If you're new to overclocking, let me show you exactly what we're talking about. Say we have an Athlon 1800+ that operates at 1.53GHz. That equates to the multiplier of the CPU, which is set at 11.5, multiplied by the CPU's system bus of 133MHz. 11.5 x 133MHz = 1530MHz. To overclock the CPU, we can do one of three things. Increase the multiplier, possibly like so: 13 x 133MHz = 1729MHz. Increase the bus speed, lowering the multiplier: 10 x 155MHz = 1550MHz. Or we can use a combination of both, which tends to be the most popular route: 12 x 145MHz = 1740MHz.

In order to utilize these features of the CPU, you must have a motherboard that is able to exploit both multiplier and front side bus optimizations.

> The Athlon CPU packaging has totally changed from the ceramic substrate you might have been familiar with. Gone are the days of unlocking the Athlon's multiplier with a pencil that has electrically conductive lead.

Keep in mind that this voids your CPU's warranty, as well as brings other risks to your entire system. I don't suggest overclocking without proper cooling beyond factory specifications that we often see implemented in stock boxes. You can check the [H]ardOCP Web site (www.hardocp.com) for both cooling alternatives and mainboards equipped with the features you'll need to successfully void your warranty.

The Athlon CPU packaging has totally changed from the ceramic substrate you might have been familiar with. Gone are the days of unlocking the Athlon's multiplier with a pencil that has electrically conductive lead. In the new packaging, AMD has created "valleys" that must be spanned in order for us to get the results we want.

To unlock the multiplier of the AthlonXP, we must connect the L1 bridges with a conductive "trace." If you think it looks as if they have been cut, you would be correct. AMD has laser cut the bridges in order to make it tougher on criminals that "remark" CPUs, which is selling them as CPUs with a higher clock than AMD assigns. Overclocking for fun or hobby is great, but it is frowned upon when it is done for commercial gain that usually involves an unsuspecting consumer.

Joining our L1 bridges is actually a simple process that requires a steady hand, a bit of patience, and some ordinary household items, as well as one unordinary, but fairly inexpensive, one.

Tools needed: A small flathead screwdriver, Scotch tape, a liquid conductive material, super glue, isopropyl alcohol, dry cloth, and a paper clip.

I have been doing this for a while now, and I suggest using Loctite QuickTite Super Glue Gel (www.loctiteproducts.com/Loctite_Products/detail.asp?catid=15&subid=34&plid=195). It not only does a great job on this particular project, but also has a no-clog tip that actually does not clog. That of course makes going over to your buddy's house and showing him how to unlock his AthlonXP much easier.

For the conductive material to close the bridges, we'll need one of two things that are easily available on the Web. You can buy a Circuit Works Conductive Trace Pen at www.altex.com/Detail.bok?category=Tools%3A+conductive+pens&start=1&total=1&no=2831, which allows you to draw conductive traces, or you might find a Rear Window Defroster Repair Kit that will have a conductive fluid in it at a local auto parts store. Either way you go, both work and are around the same price, anywhere from $10 to $15.

Step 1. Prepare a work area that is free of static electricity where you can safely work on your CPU. Be careful not to bend any of the pins while handling it. Clean the face of the CPU with isopropyl rubbing alcohol and a clean, dry, lintless cloth. (Coffee filters work very well.)

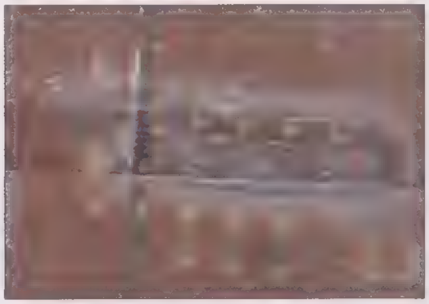
Step 2. Remove the rubber foot next to the L1 bridges. If you do this carefully, you'll be able to easily reattach it later. This step is not entirely necessary, but it will allow you a bit more room to work, which will make this project much easier.

Use Scotch tape to mask off the L1 pins. The masked area will resemble a rectangle when you're done, as described in Step 3.

Step 3. Apply the masking. Take your clear Scotch tape and mask off the L1 pins. Yes, those are the tiny little gold dots above and below the laser cuts. Use four strips of tape. Lay the first two down to cover the contact points and use the second two to mask off the ends. Your mask should resemble a rectangle with edges around the laser-cut area.

Step 4. Apply the super glue. This is where the gel-type super glue works much better than the liquid. Lay a bead of the glue down over the mask, then use a clean flathead screwdriver or about any flat, clean edge to clean up. Dragging off the excess will do two things. First, it will push the glue down into the laser cuts. Second, it will give us a smooth, flat work area to lay our traces on top of.

Step 5. Remove the masking. I find it best to do this immediately with our gel super glue. Peeling the tape from one end of your row of cuts, pull the tape back 180 degrees, so as not to exert any force pulling upward or away from the face of the CPU. I suggest allowing at least 30 minutes to dry.



You will need to mask off two L1 contacts that are separated by the laser cut, making sure the tape is firmly sealed against the surface, as described in Step 9.

Steps 6, 7, and 8. You need to repeat Step 5. Once for each set of contacts we need to close.

Step 9. Apply the masking. Again using our Scotch tape, mask off an area that contains only two of our L1 contacts separated by the laser cut. Apply the tape that will make our long sides of the mask first, then the two on the end. It's very important that these are pressed well into place. I suggest using your fingernail to make sure the tape is sealed against the surface of the CPU. Doing this well will ensure that we do not allow our conductive liquid to bleed under the tape getting to places we do not want it to get.

Step 10. Apply the conductive liquid. I used an old CD jewel case that had been cleaned to place a small puddle of the conductive liquid on. Very quickly, before it starts to dry, use the end of a paper clip and dip it into the liquid, making sure to get enough on the paper clip to cover our masked area. Dab the liquid onto the masked area until you feel as though you have gotten good coverage.

Step 11. Remove the masking. Immediately after applying the conductive liquid, remove the masking, again pulling back 180 degrees across the surface of the CPU. Allow the liquid to dry for 15 to 20 minutes.

Hopefully you'll see something that resembles this image after using your conductive liquid to cover the masked area, as described in Step 10.

Step 12. Reapply rubber foot. Using your super glue, adhere the foot we removed in Step 2.

Step 13. Test your CPU. This can be done one of two ways. If you have a multimeter, you can check the traces we just made with it, but it will be easier for many of you to simply try the CPU out in a mainboard that supports multiplier adjustments. If you can select any multiplier in the BIOS, then you did a good job.

Step 14. Protect the traces. This can be done a few different ways. The easiest is to simply cut a small section of tape to cover the traces. If you're feeling bold, you can use your super glue once again by painting a layer over the trace area.

Now pat yourself on the back and go have that cold beverage you so much deserve. If AMD knocks at your door, stash the evidence and hide behind the couch.

I hope this covers all you need to know. This little project is a good one for a weekend night, just remember, no beer till you're done. ■

Talk with Kyle at kyle@cpumag.com.

Each month we ask a staff writer to take on our publication editor in a challenge to build the best PC for a certain price. Because our writers don't want to lose their jobs, they always accept this challenge willingly. Tempers will flare. Tools will fly. But only one will prevail.

This month the challenge is to build the
Best SOHO System for less than $1,500.

Samit

Building a PC for small office/home office use is no laughing matter. No amount of name-calling or smack talk from a candy striper is going to get you a stable PC most capable of taking on the tasks you need to accomplish to earn a living.

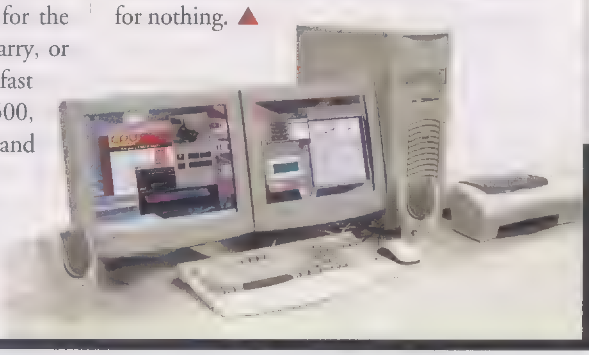
My OSes of choice for dual-CPU support were Linux, Windows XP Pro, and Windows 2000 Pro. Linux was rock stable but didn't have enough mainstream software. Windows XP Pro was a good bet but is still far from proven. And then there's Windows 2000 Pro: It has been around the block a few times, doesn't have XP's numerous driver issues, and has been proven time and again. The decision was easy: Windows 2000 Professional. After all, if it's good enough for Fortune 500 companies, it was certainly good enough for me.

Next up, the hard stuff: dual Pentium III/800 flip chips running on a Tyan Tiger 230 (VIA Apollo Pro133A-based) mobo, three 256MB PC133 DIMMS from Crucial (if you have a few bucks to spare and are so inclined, I'd recommend buying dual 512MB DIMMS instead), and dual Western Digital 40GB ATA100/7,200rpm hard drives running as masters on each channel. I also went with dual 17-inch Samtron .23 dot pitch monitors running on a 32MB ATI RADEON VE Dual Display video card, a Yamaha 16X10X40 CD-RW drive, a cheapie Visioneer ScanPort 3000, and a Lexmark 213 ColorJet printer.

As you can see, I'm not pushing for the fastest machine. Any Tom, Dick, Harry, or Nathan could run out and build a fast Pentium 4 system for less than $1,500, but sometimes it's about the brains and not the brawn. I wanted a very stable and *productive* system. You're not gonna get blistering fill rates in the latest games, but you will get tons of Desktop real estate and up to nine virtual Desktops. I partitioned the hard drives as C: (Simple Volume), D: (Striped Volume), and E: (Simple Volume). The Windows swap file is located on D:, and because that drive spans both hard drives, you get some really fast reads and writes. Let's not forget the Antec 80830 case. With loads of room for more hardware and plenty of cooling, it's the perfect case to use when you outgrow your system in a few years. Plus, it forgoes dainty pretty-boy looks for a rugged industrial personality.

The printer and scanner are cheapies purchased at Best Buy closeout sales. Best in their categories? Of course not. Good to have as a backup when your current system's laser printer or scanner fails? You betcha. I considered buying a copy of Microsoft Office XP or 2000, but the likelihood of a SOHO PC builder already owning a copy was a wee bit high. Instead I opted for a free copy of StarOffice 6.0 beta (www.sun.com/staroffice/6.0beta), which reads and saves Microsoft Office files.

With $270.56 in cash left over after rebates, you have lots of room to customize this system. Your options could include a DVD-ROM drive, two 512MB DIMMS, an upgrade copy of Microsoft Office XP (but your copy of Office 2000 should suffice nicely), a nicer scanner or printer, and a second NIC to serve your internal network. Yeah, I might be insidious, but they don't call me Samit "For The People" Choudhuri for nothing. ▲



Component	Model	Price
Case	Antec 300-Watt ATX Workstation Tower Case Model: 80830**	99.99[1]
Motherboard	Tyan S2507D Tiger 230 Dual Socket 370 FC-PGA VIA*	$97.95
Processor	Intel P III 800EB /133MHzFC-PGA (Socket 370) Retail (2)*	$125
Memory	Micron CT32M64S4D7E 256MB, 168-pin DIMM PC133 (3)***	$97.17
Hard Drive	Western Digital WD400BB 40GB 7200RPM ATA/100 9ms 2MB (2)*	$97.99
Video Card	ATI Radeon VE AGP 32MB DDR Dual Display Video Card*	$63
Sound Card	Creative Labs Sound Blaster Live! Value*	$33.99
Modem	n/a	n/a
Network Card	D-Link Desktop 10/100**	$15[2]
CD-RW	Yamaha CD-RW 2100e-b 16X10X40 IDE w/Software*	$109
Diskette	Panasonic JU-257A-607P 1.44MB* floppy drive	$10.99
Speakers	Altec Lansing AVS200W Multimedia 2 Piece System*	$15.99
Keyboard	Memorex TS1000 Keyboard** (spillproof)	$12.99[3]
Mouse	Memorex ScrollPro Mouse**	$9.99
Software	Microsoft Win2000 Pro (OEM)****	$169
Monitor	17-inch Samtron (2)**	$299.98[4]
Miscellaneous	Visioneer ScanPort 3000**; Lexmark 213 ColorJet printer**; Belkin USB A/B Cable**; CD-ROM Audio Cable****	$49.99[5] $59.99[6] $17.99 $2
Subtotal		$1,388
Tax		$54.23
SHIPPING		$49.21
Rebates		-$262
TOTALS		$1,229.44

Purchased From:
*Googlegear.com
**Best Buy
***Crucial (www.crucial.com)
****D.I.T. Computer (www.ditcorp.com)

Rebate Information:
[1] comes with $20 mail-in rebate
[2] comes with $5 mail-in rebate
[3] comes with $12 mail-in rebate
[4] each comes with $75 mail-in rebate
[5] comes with $35 mail-in rebate
[6] comes with $40 mail-in rebate

LLENGE

S.

Nathan Chandler
Staff Writer
Computer Power User

Component	Model	Price
Case	Colorcases Stainless Black (0303)**	$84
Motherboard	Biostar VIA KT266 AGP 4X*	$99
Processor	AMD Athlon XP 1600*	$149
Memory	384MB DDR SDRAM 266Mhz*	$88
Hard Drive	Maxtor DiamondMax Plus 40 Ultra ATA 100*	$109
Video Card	NVIDIA TNT2 M64 4x AGP 32MB*	$39
Sound card	Integrated into motherboard*	n/a
Modem	Aopen 56Kbps v.90 w/voice modem	$18
Network Card	Zonet 10/100Mbps 32-bit PCI bus Ethernet Adapter*	$9
CD-ROM	LG GCE-8160B 16X10X40X CD-RW*	$89
Diskette	1.44MB floppy drive*	$14
Speakers	KINYO PS-160 120 WATT*	$9
Keyboard	Microsoft Natural Keyboard Elite/Intellimouse combo*	$39
Mouse	n/a	n/a
Software	Microsoft XP Professional; XP Office*	$487
Monitor	Aopen 17" 0.27DP*	$139
Miscellaneous	Heat sink and fan	$15
Subtotal		$1,387
Tax		$84.70
Shipping		$15.90
Rebates		n/a
TOTAL		$1,487.60

Purchased From:
*D.I.T. Computer
**Colorcases

Nathan

I am talented at destroying things, not creating them. But when your boss hands you 1,500 bucks to take on a geeky megalomaniac editor, you don't turn down the challenge, even if you know your futile efforts will be squashed faster than bugs in Microsoft's software development labs. Stop that snickering!

With more than a month to ponder and pursue parts for my SOHO machine, I did what most people would do: I procrastinated. That's another way of saying I purchased most of my parts locally to avoid exorbitant shipping charges (no offense to my favorite FedEx guy). The single exception was the wicked case I spotted on the Colorcases site; for this luxury, I paid a dear price: 100 smackers. This case isn't just downright magnificent looking, though; it also has front-mounted USB and audio ports for quick connections, as well as trance-inducing HDD and power LEDs.

After splurging on that sexy, sexy case, it was time to batten down the budget hatches. I opted for a Biostar motherboard with integrated audio and an AMD Athlon XP 1600+, which is plenty of horsepower for typical office software. More important to me was memory. I wanted my baby to have plenty of multitasking speed; that's why I crammed in 384MB of DDR-SDRAM.

Keeping in sync with my "speed is better" philosophy, I traded hard drive capacity for hard drive speed. Instead of using an 80GB drive, which most workers would only squander on lame Moby MP3s and JPEGs of their Kool-Aid-stained progeny anyway, I opted for a drive of half the size, but with 7,200rpm performance. That'll keep an office slave frantically busy. Mush!

At first I thought the 32MB NVIDIA video card might be overkill. It's not. First, there are plenty of graphics-intensive programs at work in many offices that require significant video-processing muscle. Second, everybody entrenched in a cubicle needs to play Quake now and then. Stress relief is good for productivity, right? Right.

Office professionals can't cut corners on software; they need maximum compatibility and functionality. So grudgingly I installed WinXP Pro and WinXP Office. At least I paid the OEM price; the cost of lost dignity may have set me back a bit more.

With that, I'm ready to concede that Samit's PC, I'm sure, has smoked my uninspired (but oh, so sexy) SOHO machine. But I refuse to lose without mentioning that I don't actually work at *CPU*. I'm just the pizza-delivery guy. Who ordered this large pepperoni, anyway? ▲

And The Winner Is . . .

Not long ago, Nathan, Samit, and I walked the glitzy streets of SoHo in New York. Evidently, Samit was paying attention. In some circles, presentation really *is* everything. Some of you saps think it's what's on the inside that matters, but come on. Look at the monstrosity Samit has bred for less than $1,500. Tell me you wouldn't be left agape walking into a SOHO and seeing the resident office boy banging away on this dual-monitor beast. And hey, saps, Samit includes a cute purple Memorex box to pack your lunch in, not to mention dual PIIIs, Win2000, StarOffice 6.0, and tons of RAM into an Andre The Giant-sized tower. Hell, there's even a scanner and printer (cheapos they are) to get right to work.

Nathan's system isn't as visually, uh, "assaulting" as Samit's, but it packs WinXP (which many SOHO users will prefer), a charged Athlon, ample RAM, and a decent hard drive, plus his keyboard is better for an office. Performance-wise, I have to crystal ball how the systems compare because Samit somehow rigged (on purpose?) his system so it wouldn't run our benchmarks. Who knows what else the "Insidious" one mucked up. Can you say "down time?" While Nathan's system gratefully left space to set down a cup of coffee, I give the very slight nod to Samit, only because of the dough left over and the extra peripherals he brings to the (out-of-space) table. . . . *Blaine "Bossman" Flamig, content editor*

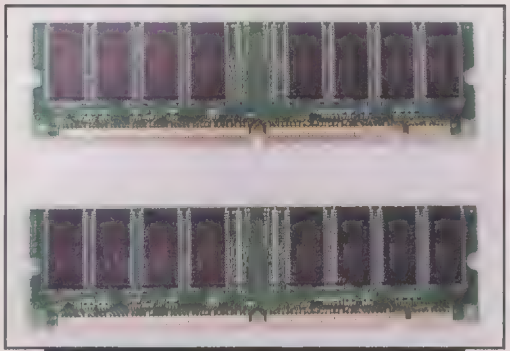
Swappin' Parts

There's A Transformation Taking Place

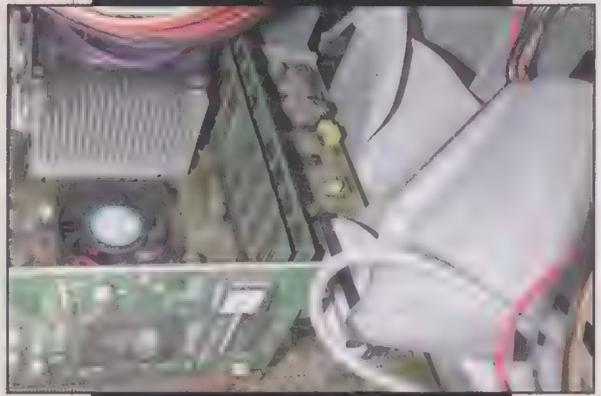
Each month in "Swappin' Parts," a Computer Power User writer upgrades one out-of-date component in our test machine, MERLE (Mediocre Electronic Refurbished Low-end Equipment). When we're finished, we will have transformed MERLE from a silicon trash can into a powerful system we'd be proud to put in our own homes. To date, we've upgraded MERLE's CPU, sound card, and speakers.

We've wasted what must amount to being days looking for things we've lost. Car keys, checkbooks, IDE cables—they all seem to elude us. If we could just remember where we put things, we could be much more efficient and get a whole lot more done. Similarly, a PC with insufficient memory can't perform up to its true potential. Such has been the case with our test machine, MERLE. Yeah sure, MERLE has enough memory to cope for the time being, but given our ambitious plans, MERLE's going to need a memory overhaul sooner rather than later.

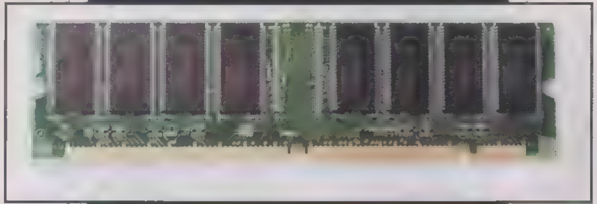
Because upgrading RAM is probably the easiest, fastest, and least expensive performance upgrade you can make to your PC, it was high time we beefed up MERLE's feeble memory supply. And because there's no need to install software drivers or play with any special configuration settings, it was a snap to do. We just plugged in our RAM and MERLE was ready to go.



DIMMs are keyed so they can only be installed one way. Pay attention to the notch and make sure it lines up with the bump in the memory socket.



The memory sockets are typically located near the front of the motherboard. In some instances, you will have to remove resident memory modules before you can install the new ones.



The PC133 SDRAM we put into MERLE isn't too fancy, but hey, we were able to stuff 512MB of it into him for less than $75.

Select Your RAM

The biggest problem with upgrading memory for most newbies or less-experienced users is figuring out which kind of RAM is compatible with their systems. Understanding the difference between SDRAM, RDRAM, and DDR-DRAM can be intimidating for those unaware of the differences. Fortunately, the PC's motherboard eliminates a lot of options because motherboards are configured to work with a specific memory type.

As we've mentioned earlier, we misplace things. Manuals seem to have an average shelf life around here of a couple days. When PC or motherboard documentation vanishes and the type of RAM you need is in question, head to Web sites for memory manufacturers PNY (www.pny.com) or Crucial (www.crucial.com) and use their searchable compatibility databases. If you built your own system, most motherboard manufacturers have online documentation. We went to BioStar's Web site (www.biostar-usa.com) to get the information we needed about MERLE's M7VKD motherboard.

We were dying to slap some DDR-DRAM into MERLE, but his motherboard only supports PC133 SDRAM. On the plus side, SDRAM is less expensive than DDR-DRAM. Of course, memory prices in general are dirt-cheap now thanks to a glut in the market, but we're always looking to save a few bucks. We found two sticks of 256MB PC133 SDRAM (to go with the M7VKD's 133MHz front side bus) for about $35 each at Best Buy. Including tax, we spent $74.53. In comparison, PC2100 DDR-DRAM would've cost us roughly $60 for a 256MB memory module.

How Much RAM?

Figuring out how much RAM you need largely depends on the software you want to use, starting with the OS. The recommended amount for

Windows Me is 64MB, while 128MB is recommended for Windows XP (64MB is the bare minimum). A good place to start is doubling the amount of RAM recommended for your OS. Microsoft is notorious for underestimating the amount of RAM Windows needs, so if you use WinXP, 256MB is a good starting point. For most WinMe users, 128MB will be a comfortable amount.

Memory-intensive applications, such as Photoshop or video-editing software, benefit from more RAM. If you're going to do a lot of video or image editing, it's worth investing in additional RAM. In some instances, 512MB or more may be helpful.

Adding too much memory won't hurt anything, but you may reach a point where the performance gain isn't worth the investment. If you never use all 256MB of RAM in a system, what good does it do to install an additional 256MB?

When To Add RAM

If you're perceptive, your system will let you know when it needs more RAM. When your PC runs out of storage space in RAM and starts hitting up the hard drive as an overflow, it will take longer to read and write from the hard drive than from RAM. The effect is very noticeable.

A constantly spinning hard drive might be another clue your PC needs more RAM. Another clue is a slow redraw. If you can see your PC redrawing your screen line by line when you minimize or close applications, you probably need more RAM.

Truth be told, MERLE wasn't doing that bad with his 128MB of RAM, but we weren't really taxing his memory too much either. As you'll see in a bit, this was more of a pre-emptive upgrade to get MERLE ready to run more demanding software rather than an answer to any urgent demand for more memory.

Time For Surgery

Installing RAM is a simple procedure and one that most of us have probably performed at one point or another. Nonetheless, we'll conduct a quick review.

We started by shutting down and unplugging MERLE. His case and motherboard didn't block our access to the memory slots, so there was no reason to remove any hardware. To make room for the new RAM, we had to remove the two sticks of 64MB SDRAM already installed in MERLE by pushing the restraining clips away from the DIMM, which lifted the DIMM out of the socket.

> **Although the additional 256MB of RAM didn't amount to any gains in SYSmark2001 scores, it does give MERLE more room to grow.**

Each DIMM socket has a number written next to it on the motherboard, and DIMMs must be installed in the lowest numbered socket available (usually closest to the processor). We didn't pay close attention to these numbers because the lower-capacity DIMMs we replaced clued us in on the sockets to use. We made sure the notches in the SDRAM were aligned with the socket and pressed each DIMM into the socket. DIMMs have cutouts on each side where the restraining clips rest when the DIMM is completely inserted.

With both sticks of RAM installed, we turned on the PC. The motherboard's POST indicated 512MB of RAM installed.

Testing MERLE

To illustrate our point about too much RAM not always yielding tangible results, we ran our benchmarks twice: once with 256MB of RAM and the second with 512MB of RAM.

Before our RAM upgrade, MERLE posted SYSmark2001 scores of 64 in Office Productivity, 78 in Internet Content Creation, and a 71 Overall score. After adding 256MB of RAM, we ran the tests again and saw modest improvements. The Office Productivity score rose three points to 67, Internet Content Creation jumped five points to 83, and the Overall SYSmark2001 score rose four points to 75. That's an increase of about 5.5% overall, which isn't stellar, but still not too bad considering 256MB only cost us about $35.

We didn't expect the RAM upgrade to help much with Video2000 scores, and we were right. Video2000 marks actually dropped a point from 1,545 to 1,544. The drop is pretty insignificant overall, however.

Next, we shut MERLE down, added another 256MB of RAM, and ran the benchmarks again. Would we see another 5% increase? Well, no. Moving from 256MB to 512MB of RAM actually netted no overall performance gain. The Office Productivity score did move from 67 to 69, but the Internet Content Creation score actually dropped from 83 to 82. This resulted in an unchanged Overall score of 75.

The Video2000 score fell a surprising 11 points after adding the additional RAM. Because we haven't upgraded the video card, the drop doesn't have us too concerned. When we upgrade the video card next month, we should see a huge increase in Video2000 scores.

Although the additional 256MB of RAM didn't amount to any gains in SYSmark2001 scores, it does give MERLE more room to grow. The extra RAM will be appreciated if we ever install WinXP, and it means MERLE is more than capable of editing images and digital video.

Coming Soon

Next month MERLE will truly begin to leave behind his underperforming ways, as we tackle replacing his infernal video card. After we install some polygon-crunching hardware, we might even let MERLE up from the dark, dank basement we've been keeping him in.

by Chad Denton

tomorrow morning, will you choose to give 110%? 75%? 33%? 14%?

Meet the newest Harvest® bar. The delicious morning energy bar from PowerBar. Made with sweet raisins, whole oats, and dipped in yogurt. Plus it's loaded with soy protein, and 16 essential vitamins and minerals for the energy to help you power through your morning. So grab one. And give it your all. Maybe even a little more.

PowerBar Be great.

X-ray Vision: RDRAM vs. DDR

It has all the trappings of a great heavyweight boxing match: evenly matched foes with different skills, an ongoing war of words, and the backing of powerful promoters. In the tussle between the RDRAM and DDR computer memory technologies, though, you won't see any boxing gloves or crooked judges. The preference of computer users will determine the eventual winner of these competing memory technologies as the industry standard.

In geek speak, the RDRAM vs. DDR competition might go down as one of the greatest digital fights of all time, right along with Garry Kasparov vs. Deep Blue, Windows vs. Macintosh, and Lara Croft (animated version) vs. Lara Croft (Angelina Jolie version). All that's missing is the "let's get ready to rumble" guy.

The Key Players

You'll need a scorecard to get all the necessary information about the key players in this competition.

SDRAM. Synchronous dynamic RAM is the current industry standard. However, its architectural and speed limitations will eventually push other memory technologies to the forefront.

DDR. Double-data-rate memory is a direct descendant of SDRAM. DDR, introduced in 1999, can move memory twice as fast as SDRAM by moving 2 bits of data per clock cycle. DDR is short for DDR SDRAM.

RDRAM. Rambus dynamic RAM provides a different memory architecture than SDRAM. RDRAM uses a narrower bus, but its architecture includes separate control and address buses, which help it move data at a faster clock cycle than SDRAM architecture. RDRAM, introduced in 1997, can also move data at 2 bits per clock cycle.

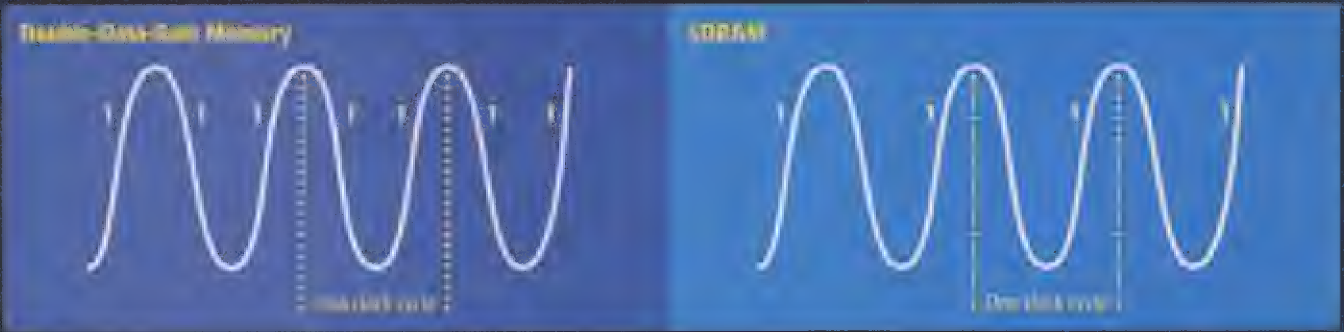
The bus. The size and width of the data bus connecting the memory with the microprocessor architecture determines the amount of data the memory can move per second. DDR and RDRAM each require their own proprietary bus architectures.

Rambus. This Los Altos, Calif., company developed RDRAM and other forms of memory. Rambus demands exacting manufacturing requirements to create the RDRAM architecture, as well as high royalty payments, which has sparked fears of high prices for RDRAM. Manufacturers can use DDR technology royalty free.

Intel. This microprocessor giant initially threw its full support behind Rambus and RDRAM, deciding to make Pentium 4 architectures using

Introducing Double-Data-Rate

Double-data-rate memory can move data twice as fast as traditional memory because it moves one bit of data on the rising and the falling edges of each clock cycle. Traditional SDRAM can only move one bit of data on the rising edge of each clock cycle. Using double-data-rate technology, a memory module with a clock speed of 133MHz gains an effective clock speed of 266MHz. Both DDR-SDRAM (usually shortened to DDR) and RDRAM are forms of double-data-rate memory.



only RDRAM. However, Intel later announced support for DDR and SDRAM in its Pentium 4 architecture because of worries over high costs and limited availability of RDRAM.

AMD. AMD has created its Athlon processors to work with DDR and SDRAM, rather than RDRAM . . . as if AMD and Intel need something else to disagree about.

Controversy, Clock Speed & Benchmarks

Rambus and Intel began cooperating around 1997 on RDRAM; others in the industry accused Intel of trying to monopolize memory and microprocessors. Rambus further ruffled industry feathers by causing several controversies—and costly lawsuits—over patents for memory technology. Claiming it owned patents to SDRAM technology, Rambus sued several SDRAM and DDR memory manufacturers a few years ago, seeking steep royalty payments. However, judges have dismissed a few of Rambus' suits, leading to several PR disasters for Rambus. During a time when memory prices are in the toilet, the high legal fees among memory manufacturers have made Rambus less popular in the industry than a Metallica appearance at a Napster rally.

Because RDRAM can currently offer significantly faster clock speeds than DDR, it potentially can come closer to keeping pace with the continually growing clock speeds available in microprocessors. RDRAM has one major problem: DDR currently appears faster from a sheer statistical standpoint. DDR architecture makes use of a 64-bit bus for moving data, which gives it an advantage over RDRAM's current 16-bit bus. It's this narrow bus architecture, though, that lets RDRAM achieve the higher clock speeds.

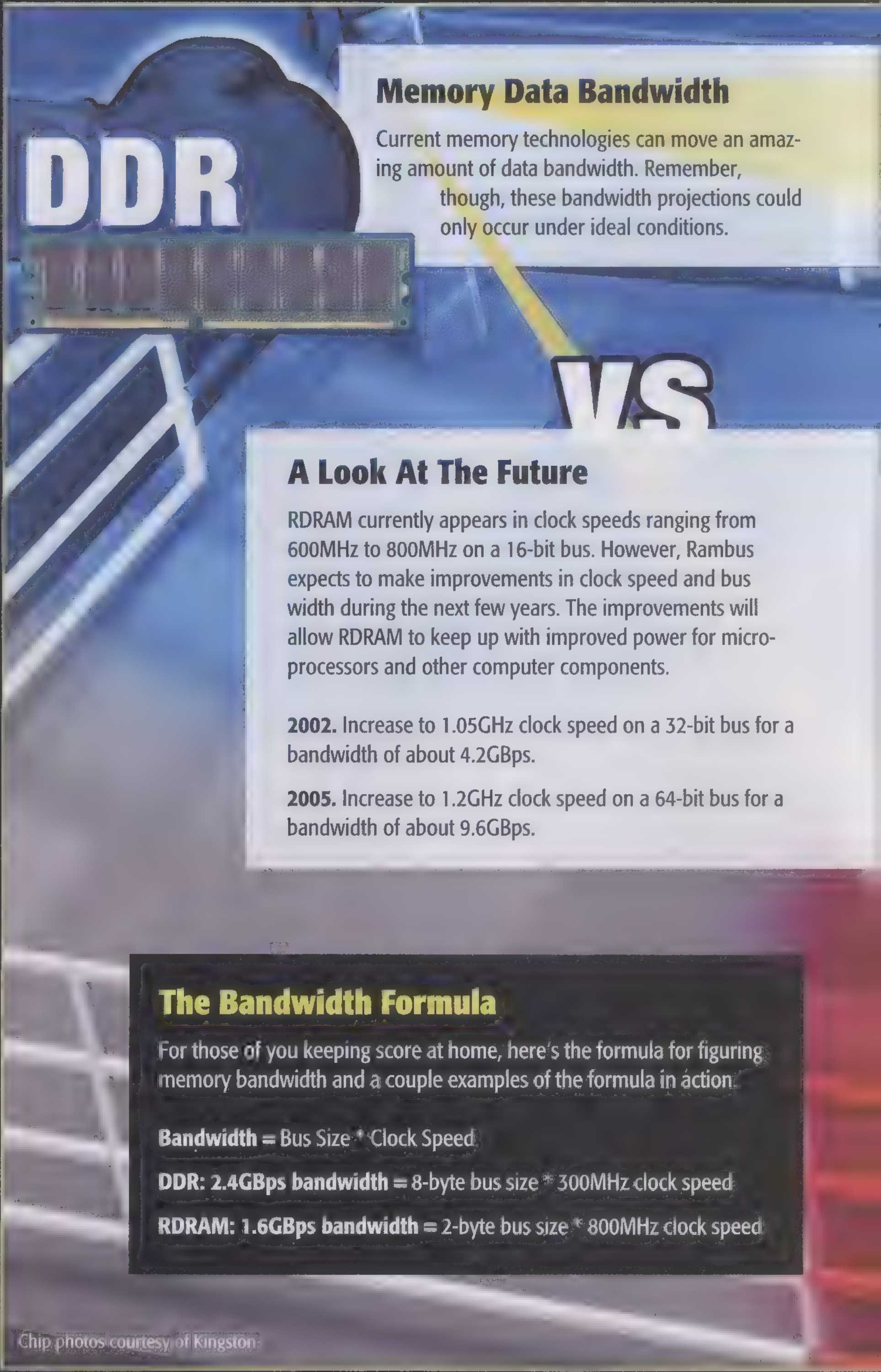
RDRAM proponents say DDR's real-world performance comes nowhere near meeting its lofty statistical standards. Use of a wider bus means DDR must move memory in larger

Tale Of The Tape

Here's a breakdown of some of DDR and RDRAM's vital stats.

	DDR	RDRAM
Bus Size	64-bit	16-bit*
Top Bus Speed	300MHz	800MHz
Top Bandwidth	2.6GBps	1.6GBps

*Rambus has announced plans for 32-bit and 64-bit buses in the future.



Memory Data Bandwidth

Current memory technologies can move an amazing amount of data bandwidth. Remember, though, these bandwidth projections could only occur under ideal conditions.

A Look At The Future

RDRAM currently appears in clock speeds ranging from 600MHz to 800MHz on a 16-bit bus. However, Rambus expects to make improvements in clock speed and bus width during the next few years. The improvements will allow RDRAM to keep up with improved power for microprocessors and other computer components.

2002. Increase to 1.05GHz clock speed on a 32-bit bus for a bandwidth of about 4.2GBps.

2005. Increase to 1.2GHz clock speed on a 64-bit bus for a bandwidth of about 9.6GBps.

The Bandwidth Formula

For those of you keeping score at home, here's the formula for figuring memory bandwidth and a couple examples of the formula in action.

Bandwidth = Bus Size * Clock Speed

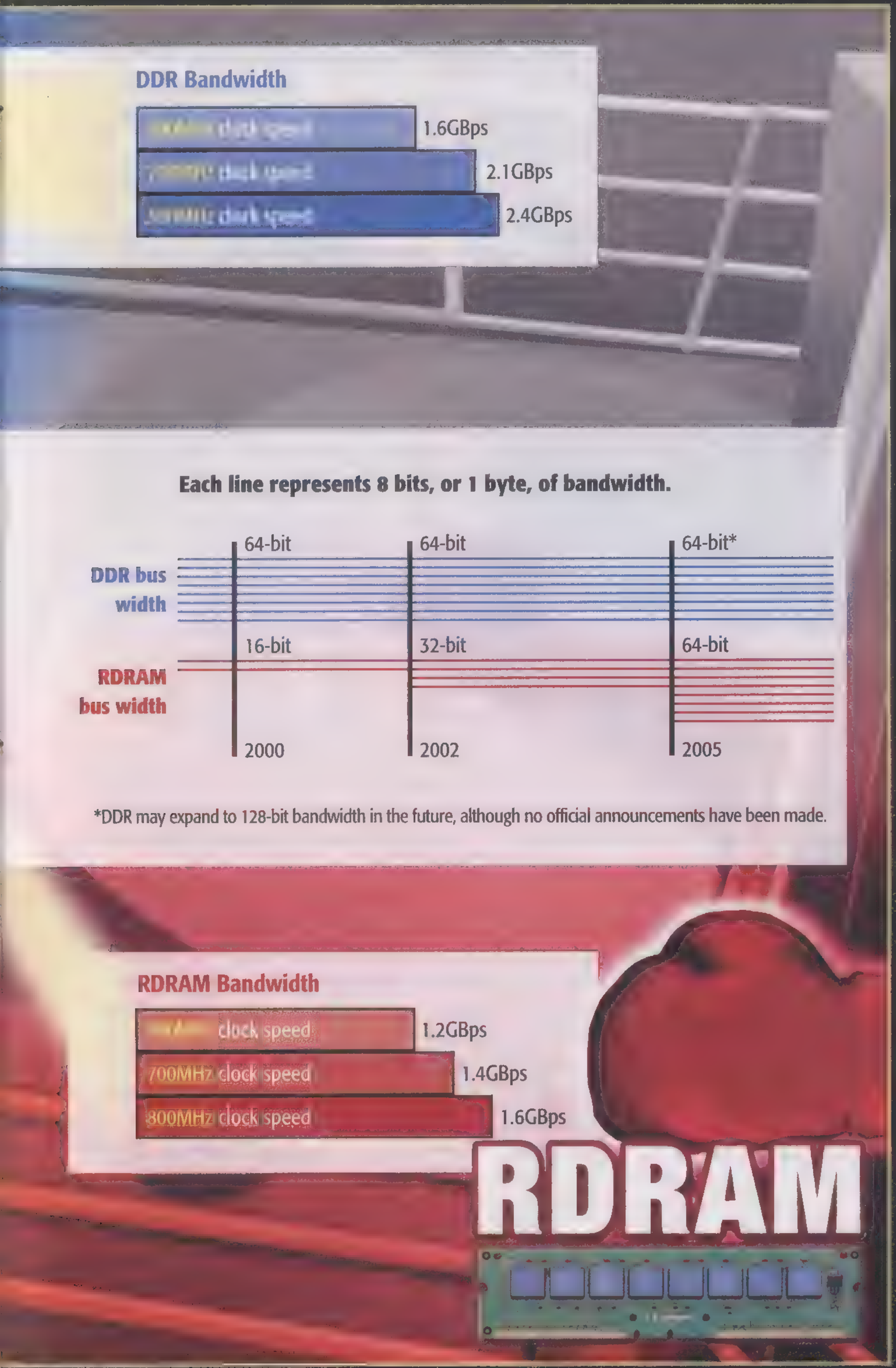
DDR: 2.4GBps bandwidth = 8-byte bus size * 300MHz clock speed

RDRAM: 1.6GBps bandwidth = 2-byte bus size * 800MHz clock speed

Chip photos courtesy of Kingston

chunks to fill the bus completely. Small chunks of data don't use the full capacity of the bus. DDR proponents point to RDRAM's high price and shaky benchmark results for CAS latency measurements as good reasons for jumping to DDR.

Benchmark measurements for the new memory technologies are confusing at best. They seem to indicate that a host of factors, such as the overall computer architecture and the type of software in use, go a long way toward determining whether a particular type of memory reaches its maximum potential bandwidth. Most experts agree that RDRAM's benefits might not be readily apparent unless you're running high-end multimedia software, for example.



Each line represents 8 bits, or 1 byte, of bandwidth.

*DDR may expand to 128-bit bandwidth in the future, although no official announcements have been made.

Graphics & Design: Carrie Benes & Jason Codr

Keep in mind that a maximum potential bandwidth for memory is just that, a potential. Conditions must be perfect for memory chips to reach their full potential.

In Search Of The Sweet Spot

At this time, it appears neither RDRAM nor DDR will disappear any time soon, which is good news for consumers. It may take a few rounds of future technological improvements before a winner emerges from this fight. Rambus is planning to increase its bus width and overall clock speed in the next few years, while DDR proponents are working on a new memory spec, called DDR 2, that will provide improved clock speeds and a potentially wider bus.

While RDRAM probably delivered the first hit in the memory battle, thanks to having microprocessor powerhouse Intel in its corner, DDR has shown resiliency. DDR (and DDR 2) have enough promise that Intel is hedging its bets by splitting its allegiances and offering support for both memory types. Gaining support from Intel was a big step forward for DDR manufacturers.

Bottom line: Consumer preferences will eventually decide this battle. If RDRAM lives up to its high-speed promises, allowing it to work more in tandem with microprocessors for superior performance, users will probably be willing to pay a premium for it. However, if DDR's evolution lets it keep pace with RDRAM in performance, its lower price and greater availability will leave it standing alone in the end.

As with almost any computing component, finding the sweet spot in the price and performance combination will help one of these memory types deliver a KO punch. CPU

by Kyle Schurman

Intel Hyper-Threading

Move Over, Clock Speed

One word in the English language genuinely sparks fear in the hearts of parents and teachers alike: hyper. Trying to deal with a room full of children described as "hyper" is one of the worst nightmares a teacher or a parent hosting a birthday party can imagine. Considering this connotation, Intel's decision to name one of its latest technologies is a bit curious. However, Hyper-Threading technology from Intel just might make you feel a bit less apprehensive about the word "hyper."

Hyper-Threading has nothing to do with 20 five-year-olds screaming for their afternoon juice and cookies. Instead, Hyper-Threading has everything to do with improving the overall performance of future Intel microprocessors. If software and hardware developers embrace Hyper-Threading technology as Intel thinks they will, many users will begin enjoying its benefits within the next few months, and nearly all computer users could see some benefits within 18 to 24 months.

Off-The-Wall Announcement

If you follow the computer industry at all, you know that large companies keep secrets about as well as a group of hyper second-graders. Officials at most tech companies regularly (and often on purpose) leak information to the media about upcoming technologies and projects. Companies usually incorporate code names with the leaks to generate a little more buzz. Remember the almost 3 years we heard about Chicago before Microsoft released Windows 95?

Hyper-Threading had its own code name (Jackson), but it didn't make big headlines anywhere but inside Intel. Intel's announcement of Hyper-Threading technology in late August 2001 at the Intel Developer Forum caught most media members and developers off guard, especially considering Intel engineers had been working on the technology for at least 5 years.

"Big companies are not notorious for keeping secrets," says Shannon Poulin, enterprise marketing manager at Intel. "It was as good a secret as you could hope for." Hyper-Threading technology may have been a surprise to those outside Intel, but it didn't take long for them to think Intel had a winner on its hands. "We've had positive feedback from a lot of different sources," Poulin says. "It's receiving a lot of attention."

Intel's Xeon processor family will be the first to incorporate Hyper-Threading technology in the first half of 2002.

It's So Simple, It's Brilliant

Hyper-Threading technology doesn't involve a complete technological overhaul of the microprocessor. In fact, the idea is simple enough that you might wonder why it took this long to implement. With Hyper-Threading, software and OSes treat the microprocessor as though it's two microprocessors, such as exist in a dual-processor system. Hyper-Threading technology lets the microprocessor handle simultaneous requests from the OS or from software, initially improving performance by around 30% to 40%. Hyper-Threading can work with one data instruction set from two different software applications or two different instruction sets from a single software application.

Intel engineers had determined over the past several years that they needed to provide some form of parallel processing technology in their chips because of potential problems with relying on increased clock speeds alone for processor improvements. (See the "Violating Moore's Law?" sidebar.) When considering its options for providing the ability to handle parallel data instructions, Intel could've taken two paths besides Hyper-Threading: offering an actual dual-processor system or offering a single processor with certain dual components on the processor, such as two FPUs (floating point units).

While those options probably would have provided a better performance boost than will be available with Hyper-Threading, they also would've been more expensive. So Intel gave Hyper-Threading the nod as a technology to increase the processor's speed without sending consumers to the poor house. "We expect the price points [of Hyper-Threading-enabled processors] to be very similar to where we are today," Poulin says.

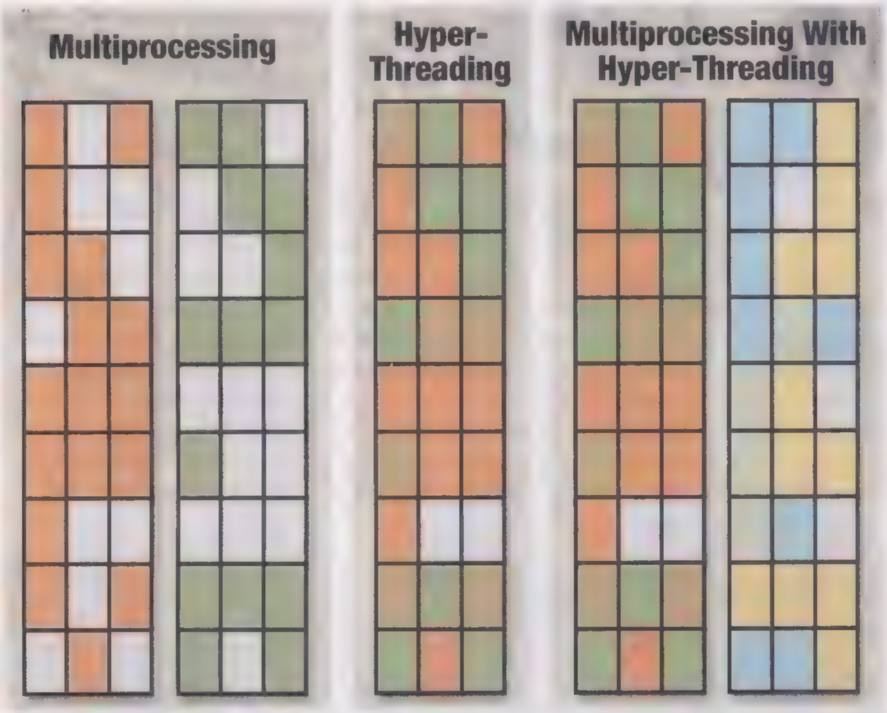
Working Double-Time

A processor using Hyper-Threading technology manages the incoming data instructions in parallel by switching between the instructions every few nanoseconds, essentially letting the processor handle two separate threads of code at once. During the switching

Hyper-Threading In Action

With a Hyper-Threading-enabled microprocessor, a single microprocessor can approach the processing power of a dual-processor system. This map shows how Hyper-Threading can take advantage of resources in the microprocessor that normally sit idle.

In the Multiprocessing map, each column represents one processor in a dual-processor setup. The Hyper-Threading map shows how the tasks being performed in the dual-processor setup could work in a single, Hyper-Threading-enabled processor. In the Multiprocessing With Hyper-Threading map, you see how a dual-processor setup running Hyper-Threading could limit its idle time, becoming almost twice as efficient as a traditional dual-processor setup.



SOURCE: INTEL

KEY: Orange, Green, Blue, and Yellow areas each represent a data set the microprocessor is running. The Gray areas are idle times for the microprocessor. The Green/Orange and Yellow/Blue striped areas represent data overlaps where a Hyper-Threading microprocessor would slow down as compared to a dual-processor setup.

process, Hyper-Threading can pick up where it left off very quickly because it tracks the status of each parallel data instruction set.

Under current microprocessor architectures, the microprocessor must handle the data piece by piece in a logical order. Intel compares this to a person trying to watch television and talk on the phone at the same time. The person must listen to the television for a few seconds until the input data segment is complete, then switch to the phone, handling the data input from each source one at a time. With Hyper-Threading, the switching occurs so quickly that the speed of the data processing improves, and it's almost like being able to accept data input from the television and the phone at once.

Hyper-Threading makes better use of the entire power of the microprocessor at once. Intel estimates that while executing a typical set of data instructions, the traditional processor only uses about 35% of its architecture resources. Hyper-Threading gives the processor a second set of code to work on, allowing for simultaneous use of more resources.

Poulin compares this idea to a single person's home. One person can only be in one room of a home at a time, meaning the resources in other rooms in the home sit idle. Hyper-Threading would be like having two people in a home at once, working in different rooms. The two people can make better use of the home's overall resources by working at the same time. They can also share the same room, or resource, when necessary.

Speaking of using all available resources, Hyper-Threading takes advantage of circuits already included on Intel microprocessors, such as the Pentium 4, that previously went unused. For instance, Hyper-Threading takes advantage of normally idle register circuits, which manage data inside the chip, to gain access to multiple areas of the processor at the same time.

And there's more. Intel says Hyper-Threading technology will benefit individual processors in a multiple processor system, too, letting them work more powerfully both on their own and as a team. Hyper-Threading is essentially the same as SMT (Simultaneous Multi-Threading) technology. SMT is the generic name for the technology used throughout the industry; Hyper-Threading is Intel's brand name for SMT.

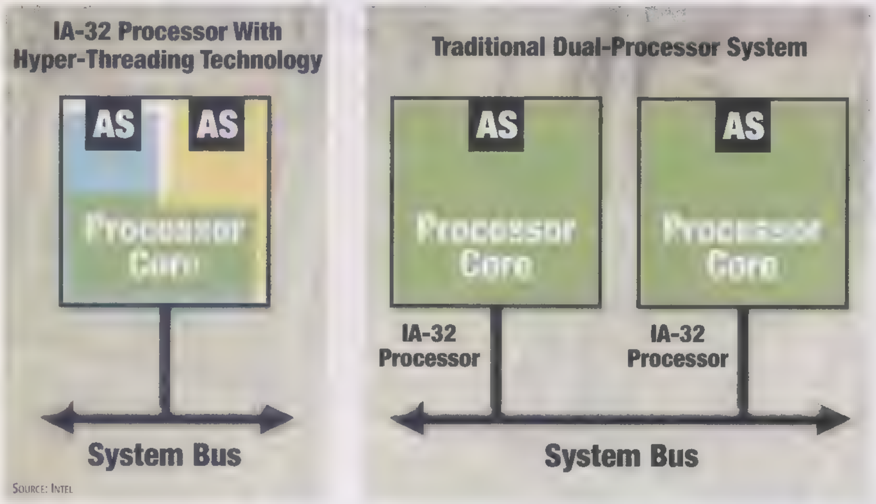
Intel plans to include Hyper-Threading or another form of SMT technology in its high-end line of 64-bit Itanium processors, which will often appear in multiple-processor systems. Some analysts think adding Hyper-Threading to the often-delayed Itanium is vital to its viability. Because 32-bit processors using Hyper-Threading will offer performance levels closer to the proposed 64-bit processors, analysts think users might not be willing to pay a large premium for the 64-bit processor.

What To Expect & When

Full incorporation of Hyper-Threading will take at least a couple of years. Servers using Intel's Xeon family of microprocessors should see the first implementation of Hyper-Threading in the first half of 2002. Heard about Intel's chips code-named Foster? They're the Hyper-Threading-enabled Xeon chips.

Hyper-Threading technology is a natural fit for servers because most of the software running on servers can already

The Hyper-Threading Architecture



Source: Intel

In the processor with Hyper-Threading, the physical processor consists of two logical processors that share a single processor core. In the dual-processor system, each processor is a separate physical processor. (AS stands for IA-32 Architectural State.)

handle dual processors. Hyper-Threading technology only provides benefits for OSes and software apps that offer support for dual processors. "Most server software is already ready [for Hyper-Threading]," Poulin says. "There's a little bit more heavy lifting for other OS developers. . . . It's a technology that needs multiple components to be effective."

Most other types of software, including those designed for desktop systems, aren't optimized to take advantage of a dual-processor system. Developers of those types of software and OSes will need to tweak their code to take advantage of Hyper-Threading. Intel is in the process of trying to convince those developers about the advantages of Hyper-Threading to encourage them to make the necessary coding changes. Intel is planning to help developers by providing skeleton coding. Hyper-Threading is also backward-compatible, meaning software apps not designed to work with Hyper-Threading will continue to run on Hyper-Threading-enabled microprocessors . . . just without the Hyper-Threading optimization.

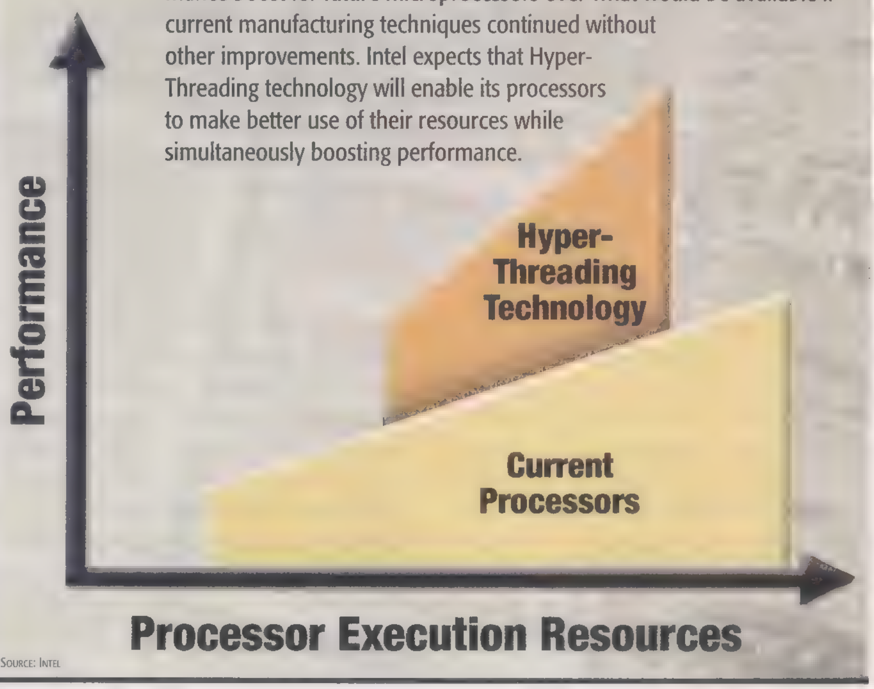
Desktop users should see microprocessors featuring Hyper-Threading technology in 2003 or 2004, depending on how quickly developers are willing to incorporate support for the technology in their software and OSes. Poulin says Intel expects Hyper-Threading to eventually appear in Pentium 4 microprocessors. Hyper-Threading will be a key component in helping Pentium 4 eventually reach clock speeds of 10GHz before a new architecture—a Pentium 5 perhaps?—is required. At the Intel Developer Forum, Paul Otellini, an Intel executive vice president, demonstrated a Pentium 4 running at 3.5GHz and made the 10GHz prediction.

What's coming. Intel believes people running servers with Hyper-Threading technology in the next several months will see their greatest performance enhancements in the number of Web users a server can handle at one time. Servers enabled to use Hyper-Threading will be able to accept more simultaneous, secure transactions, as well.

High-end gamers will see greatly improved performance, as Hyper-Threading lets the microprocessor handle multiple requests from the gaming software at once. In a single-processor setup, data instructions from the gaming software might have to wait for microprocessor time. If the OS needs to access

A Hyper-Threading Boost

As you can see from this Intel graph, the company expects that new microprocessor technologies, such as Hyper-Threading technology, should provide a major performance boost for future microprocessors over what would be available if current manufacturing techniques continued without other improvements. Intel expects that Hyper-Threading technology will enable its processors to make better use of their resources while simultaneously boosting performance.



Source: Intel

the microprocessor while the game is running, Hyper-Threading will make such interruptions easier for the microprocessor to handle without a noticeable loss of gaming performance.

Some desktop computer users might not notice Hyper-Threading as much as power users, but nearly everyone will see some benefits at some point. Processor-intensive tasks, such as playing an MP3 clip, will no longer drag the computer to a crawl, making it possible to run other simultaneous tasks. "If you're a desktop user like me, you have 15 things open at the bottom of the screen," Poulin says. "The advantage of Hyper-Threading is it provides different levels of performance, depending on the application. . . . We've run simulations where the switching [between applications] is seamless. Hyper-Threading enables the microprocessor to switch quicker and run at full performance. It makes a system that's built for multitasking."

A Good Kind Of Hyper

It was interesting to note that Intel officials at the Intel Developer Forum were discussing the future of 10GHz P4 chips 1 minute and how clock speed improvements weren't the only means for achieving greater chip performance the next minute. The media has long focused its attention on clock speed improvements when discussing new microprocessors, and manufacturers, such as Intel, did little to discourage such discussions.

However, with new microprocessor technologies such as Hyper-Threading becoming a reality, it's obvious Intel is hoping to steer some of the focus away from pure clock speeds and toward architectural improvements that provide real enhancements in performance. That may help Intel distinguish itself from other microprocessor manufacturers. Hyper-Threading is a great start in that direction. Trust us, Intel's brand of hyper will be a good thing for users, be they teachers, parents, or excitable children. Best of all, no Ritalin is required. CPU

by Kyle Schurman

Violating Moore's Law?

No one wants to run afoul of the law, especially when the founder of the company laid down this particular law. However, Intel engineers and researchers within the past couple of years began to fear Moore's Law was one of those rules that was meant to be broken. Gordon Moore, co-founder of Intel, introduced the idea that the number of transistors on a chip will double every 18 to 24 months, thanks to technological improvements. This prediction became Moore's Law, a blueprint for almost 30 years (and counting) for microprocessor improvements.

Researchers are now realizing the difficulties in trying to keep up with Moore's Law. Although it's feasible that microprocessors could run at 20GHz or better by the end of the decade, other logistical problems, such as heat dissipation and finding enough room for the ever-shrinking transistors, will make such performance levels very difficult to achieve. Intel officials have estimated that a 20GHz chip, running under cooling technologies similar to those that exist today, could generate heat proportionally equal to a nuclear reactor. Ouch.

Rather than give in to such logistical problems and violate Moore's Law, though, researchers have begun looking to make technological improvements in other areas of the microprocessor, thereby improving performance without generating enough heat to melt the computer itself. Although the focus for microprocessor manufacturers has centered on clock speed for years, you can expect the emphasis to begin to drift toward other technological advancements in the next few years. Hyper-Threading is the first step in that direction for Intel. Some other future improvements to the microprocessor architecture Intel has mentioned include:

Low power. Microprocessors must require less electrical power to operate in wireless, battery-powered devices in the near future. For example, a new type of mobile processor from Intel, codenamed Banias, should appear in 2003 with a reworked architecture that stretches battery life through means such as shutting down portions of the chip not in use and using low-power circuits.

Low heat. As microprocessors appear in smaller, portable devices, they must generate less heat and dissipate it more efficiently. Chips consuming less power will generate less heat, for example.

Small architecture. Intel is currently using a 0.13-micron production process, down from the 0.18-micron processing it used until recently. Smaller production processes will yield smaller chips with more power in the future.

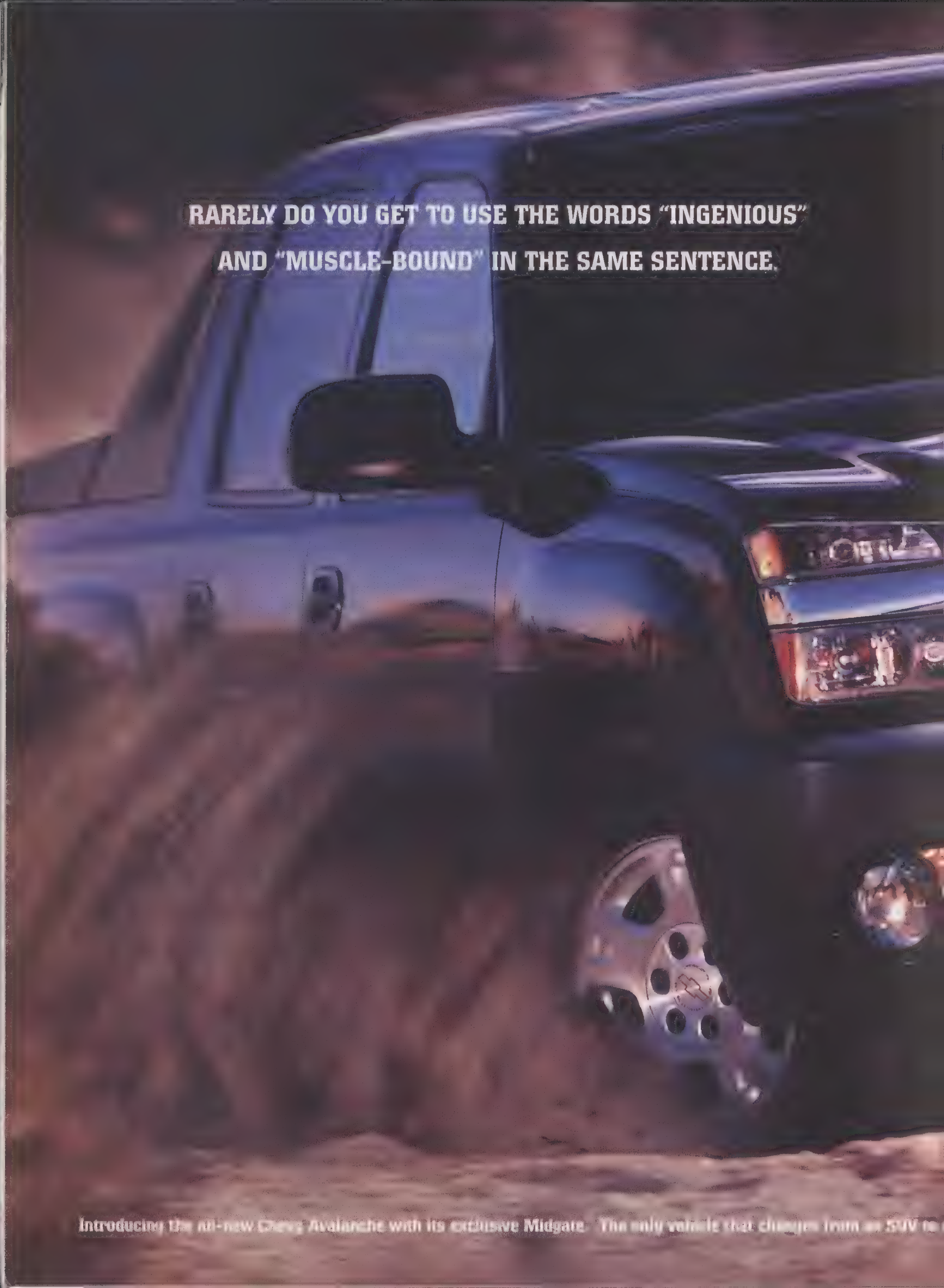
More cache. Intel expects to add an L3 cache to the next version of its high-end processor, codenamed McKinley, which will improve performance. High- and low-end chips will continue to see larger cache areas, too.

Parallel processing. The early version of Hyper-Threading should provide performance improvements of around 30%. Future versions will improve on that mark.

New components. At some point in the future, researchers will reach the limitations of silicon for providing ever-improving processing power. Researchers are already looking at other components for a new era of microprocessors. Eventually, another type of technology could replace the transistor itself.

Overall speed. While Intel might be de-emphasizing clock speed in its processor improvements, don't misunderstand: Clock speed remains an important measuring stick for processor power. Nearly every type of application will take advantage of continued faster clock speeds. Processor-intensive applications, such as voice recognition and video editing, may benefit the most. ▲

See our Moore's Law chart at www.smartcomputing.com/cpumag/feb02/mooreslaw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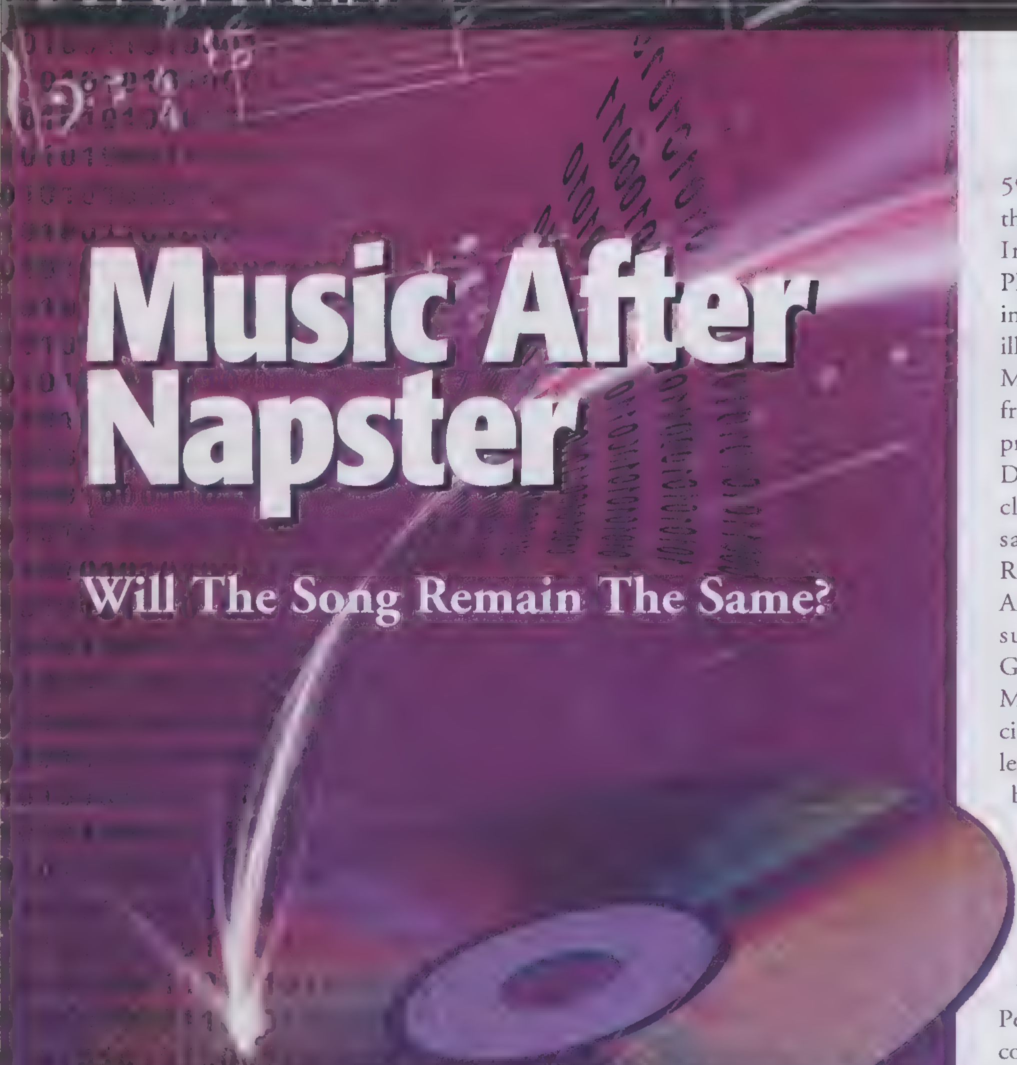


Music After Napster

Will The Song Remain The Same?

Record label execs aren't stupid. Napster (www.napster.com) proved an online audience for music exists, and much of that audience is likely willing to pay for downloadable tunes instead of retail CDs. Why, then, has it taken record companies so long to make legal music available?

Jay Samit, senior vice president of New Media at EMI Recorded Music, says, "It takes a lot longer to build a legitimate business than to steal stuff. If Napster was so brilliant, why could it steal all its stuff for free and still not make a buck? Also, people forget that it's not like any one person or company controls all the rights necessary to launch such a business. Every song has multiple owners: The music publisher. The recording company. The artist. Coming up with a new business model that works for everybody takes time and effort."

There's also a question of how to get songs into people's hands without leaving the content open to Napster-like abuse. No security system is foolproof, but DRM (digital rights management) schemes—such as those from Microsoft, RealNetworks, and Liquid Audio—are quite effective at preventing unlicensed use to anyone except determined, experienced hackers. Until recently, copyright holders have been reluctant to accept this.

However, three years after the birth of the Diamond Rio and roughly nine months after Napster 1.0's death, legal online music is finally taking off in earnest. Will the coming wave of services prove successful or will the war between consumers and the recording industry continue?

Better Sorry Than Unsafe

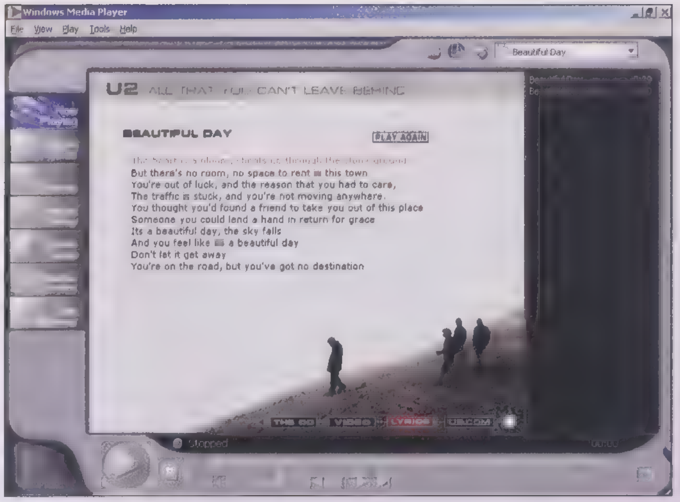
Faced with rampant user-to-user music piracy via CD burners and a 5% decline in retail CD sales during the first half of 2001 (according to the International Federation of the Phonographic Industry), the recording industry has sought to clamp down on illegal copying at the source. Universal Music Group has stated that its CDs from October 2001 on will feature copy protection (see the "Singing The Broke-Down CD Blues" sidebar in this article). Other labels are heading in the same direction. The RIAA (The Recording Industry Association of America) is still suing file-sharing sites such as KaZaA (www.kazaa.com), Grokster (www.grokster.com), and Morpheus' Music City (www.musiccity.com). Few would argue against the legality of blocking swapping services, but cutting off the ability to play CDs in several types of players has some critics accusing the industry of restricting fair use.

Without question, the recording business has upset many consumers with arguably draconian tactics. People want to manage music on their computers, but labels are removing the conventional ways to do so without immediately offering substitute solutions. Secure music formats are readily available, but labels appear to be dragging their feet in using them to provide consumer solutions.

"First, copyright holders are still not satisfied that some of these secure formats are indeed secure, which has been proven in the past," says Mike Paxton, a Cahners In-Stat Group senior analyst. "Second, labels really had very little in terms of content that could be distributed like that. Third, consumers have routinely and overwhelmingly said that they didn't want to pay for this kind of content. So even as we've seen Liquid Audio and others offering music content for sale, consumers have given it a huge thumbs down and said, 'That's nice, but we don't want to pay for that.'"

Samit affirms that even though EMI was first to offer music for digital download, "those models didn't work. People wanted a more all-you-can-eat kind of model."

So, even though consumers were saying all they wanted was to download music, actual field results were showing the average buyer desired a complete end-to-end music experience. Determining how to best package this is still under debate, but the industry seems ready to take its first stabs at offering solutions.



[illegible]
But there's no room, no space to rent [illegible] this town
You're out of luck, and the reason that you had to care,
The traffic [illegible] stuck, and you're not moving anywhere.
You thought you'd found a friend to take you out of this place
Someone you could lend a hand in return for grace
Its a beautiful day, the sky falls
And you feel like [illegible] a beautiful day
Don't let it get away
You're on the road, but you've got no destination

Microsoft's Michael Aldridge thinks digital technology has the potential to rejuvenate the traditional concept of an album. "In the '70s, especially with double albums, you had liner notes and photographs, cool artwork, and background on what the band was doing. Now, with 'download packages,' you're not actually just downloading a song but an experience with video, synchronized lyrics, links to a Web site, and more." U2's "All That You Can't Leave Behind" was one of the first major albums to use a download package.

Log On, Tune In

While free customizable streaming radio services—such as Echo, LAUNCHcast RADIO, SonicNet—were collapsing, MUSICMATCH (www.musicmatch.com) was rolling out Radio MX, the first radio service that offered CD-quality streaming MP3 content based on genres or specific artists the listener selects. For example, you might base a station on Def Leppard, but similar acts, such as Whitesnake and others you might not have heard of, would be mixed in.

"When Napster first came out, it showed the demand for total control, total access to the music people want," says Daniel Gould, MUSICMATCH vice president of Web services. "But it didn't have an important component that people want: music discovery."

Bowing both to tire kickers and dial-up users, MUSICMATCH gives away low- and medium-quality Radio MX service as part of the Jukebox app. If you want CD-quality service, a monthly subscription runs $4.95 ($10.95 quarterly; $39.95 annually). You also get cover art and links to album information, and you're able to buy the CD from a partner company.

For broadband users, Radio MX is the highest-quality streaming radio we've seen so far, and it shouldn't take long before imitators come flocking. The big question is if a subscription-based radio service is a viable, sustainable business model. Many experts think there's not enough value to persuade consumers to pay for services, but according to MUSICMATCH, Radio MX reached the break-even point within its first year and shows no sign of slowing down.

Although Radio MX may have proven that streaming radio can make money, the product is about to face a crush of subscription-based rivals in 2002, and it seems unlikely that radio alone will be enough to win the hearts and credit cards of would-be customers.

Napster Reborn

In discussing the "early 2002" re-emergence of Napster (www.napster.com), the Coca-Cola/New Coke debacle comes to mind. People learn to expect a certain experience from a brand name. Remove the experience and suddenly the name is meaningless. Napster has been telling the press and public for months that its name brand will carry consumers over from its semi-anarchistic piracy model, which boasted more than 80 million users at its peak, to its new, fee-based system. Will it carry you over?

Napster declined our interview request and declined to provide details about its forthcoming service, despite the fact that, like RealNetworks, Napster is partnering with MusicNet for its content-licensing platform. Napster CEO Konrad Hilbers offered this statement: "Napster is creating a service that makes music available to consumers on a whim, at the click of a mouse, and returns royalties and licensing fees to artists, songwriters, and other stakeholders with digital precision."

On its site, Napster has indicated its future service will be fee-based, allow sharing of licensed content among subscribers, and, in addition to supporting the unrestricted MP3 format, will sport a new secure NAP format letting content owners ascribe user rights to their files. Presumably, users will be able to search and swap songs via Napster's centralized peer-to-peer system as before, but downloaders will now be restricted to a certain number of playable items per month or will perhaps have to pay additional fees to unlock extra material. As Napster hasn't previewed the service publicly, no one is yet sure of the specifics. ▲

"In the future, I envision somebody listening to a song for the very first time, loving it, and wanting to download it right away," says Gould. "It would be optimal if you could just right-click, save to the hard drive, then listen to it again and again. You'll have links that take you to the MUSICMATCH guide for that artist that can launch stations based on that artist, links for buying merchandise—everything in one place. We have the platform. We could be ready to go with all this fairly soon. What we're waiting for is the licensing from the copyright holders."

The All-In-One Wave

Picture an application that is a multimedia-enabled Web browser; is a CD player/ripper/burner; manages content on portable devices; offers links to thousands of local radio stations and 48 nonstop, commercial-free, genre-based streaming stations of its own; provides channels for various news- and entertainment-oriented Web content; and (this is the good part) lets you stream and download legal, CD-quality music. And, the whole one-stop shebang starts at $9.95 a month.

Inviting? Sure. Worth paying for. We didn't really think so until RealNetworks (www.real.com) offered us a one-month trial of its new RealOne Music player and service. We have used RealPlayer and RealJukebox in the past and given them a resounding, "Um, OK." This is different, though. RealOne is simple, slick, eminently useful, and the product of Real's partnership with MusicNet (www.musicnet.com).

In the business of providing the general public with secure music from record labels, someone has to manage the rights, cash flow, digital content, partnerships, and other back-end platform work. MusicNet and pressplay (www.pressplay.com) have emerged as the leading platforms of choice. MusicNet brokers the holdings of BMG, EMI, Warner Brothers, and Zomba; pressplay handles EMI, Sony Music, and Universal.

MusicNet is founded on the DRM technology of RealNetworks, pressplay on Microsoft Windows Media. Neither MusicNet nor pressplay actually determine consumer-pricing plans; instead, sales partners handle all of the front-end work—everything from how files are distributed to skins for the interface. For example, MusicNet is offered through Napster, RealNetworks, and AOL. All three incarnations are likely to provide different looks and user features, even though the underlying content and platform is the same.

An all-in-one application doesn't mean all-you-can-eat, though. For $9.95, RealOne gives you "tokens" for 100 CD-quality downloads and 100 near-CD-quality streams every month, in addition to the bundled radio services ($14.95 for 150/150 tokens; $19.95 for 200/200). Say you download 98 songs the first day of your RealOne membership. The next 29 days, you can only download two more songs. When your next month starts, you might mark 20 existing downloads as "inactive," essentially rendering them inaccessible so you can snag 20 new songs this month. You really like the other 80, so you set them to auto-renew every month. At the start of the third month, you want to bring back five of the 20 you made inactive. You don't need to download the songs again because they're already

Singing The Broke-Down CD Blues

"No more do folks think that a sliding CD-ROM tray is a cup holder," reads one introductory page on the RIAA's (Recording Industry Association of America) Web site (www.riaa.org). "Pop your CD into it and you hear music, which you can now convert into a file."

Apparently, the RIAA's left hand doesn't know what the right one is doing because copy-protected CDs, designed to be unplayable in CD-ROM drives, started appearing in Germany back in 2000 as part of a trial by BMG Entertainment. In May 2001, country singer Charlie Pride's "Tribute to Jim Reeves" CD was similarly protected. BMG buyers reported that some discs wouldn't play in CD players, while Pride purchasers complained their discs wouldn't work in car-mounted CD decks or DVD players. The Charlie Pride CD directed PC users to insert the disc into their online systems in order to download licensed copies of the disc's contents. What the CD's notice didn't say was that users would be required to divulge their names, addresses, and e-mail addresses before proceeding to the downloads, which in turn can only be played on the PC that retrieved them.

More than a million copy-protected CDs are now in circulation, and every major record label is either using or examining the technology. Although security-platform designers aren't discussing the specifics of their schemes, most approaches entail adding false data in a CD's table of contents, as well as data errors in the music. Music players are designed to ignore such glitches, but CD-ROM-based drives, which are designed to religiously read data, will stumble on the errors and stop playing. More advanced CD and DVD players often incorporate CD-ROM-type technology for better accuracy and thus can fall prey to incompatibility. Plug *NSYNC's "Celebrity" CD into your system and see for yourself.

Macrovision (www.macrovision.com), the same company that copy protects your VHS movies, is examining an alternative music-protection technology from TTR Technologies that would introduce distortion that sounds to the listener like "clicks and pops." If you want to see if any of the discs you've bought recently are protected, try examining them with some of the utilities available from CD Media World (www.cdmediaworld.com/hardware/cdrom/cd_utils_2.shtml). ▲

on your system. Merely deactivate five songs to make room for the five you want to reactivate.

If you don't want to commit a download token to a new song or you're deliberating whether to buy the CD featuring a hit single you like, use your streaming tokens to listen to questionable tracks a single time. You get a new set of streaming tokens every month.

Downloaded content is in Real's proprietary format, so you can't run licensed tracks in Winamp or a similar player. You also can't burn tracks to CD or move them to a portable device, although both functions are well supported for MP3 content. Here, Real shows its disadvantage to Microsoft in that many players now support Microsoft's WMA DRM scheme, but Real has yet to forge similar alliances. Although restricting how many times you can copy or burn a secure file is possible, no governing policies are yet in place for entire music catalogs or services.

So are you ready to spend cash for access to a limited catalog of downloaded music that stays trapped in your PC?

"There's so much out there on the Internet now and in people's own CD collections that paying $120 a year, or even $60 a year, just doesn't make sense," says Paxton of Cahners. "Don't get me wrong. The industry needs to do that, and I support what they're doing. But the first versions of what's going to happen, like MusicNet and pressplay, will be experiments. I don't think they expect it to be an overwhelming success. They certainly don't expect it to make money over the short-term."

This is a time of trial and error. Record labels are issuing CDs that won't play in PCs while offering the same music as downloadable files that you can't burn to disc, thus requiring player-savvy listeners to pay for the same songs twice. No one seems to have a grip on how to best present digital music to the public. Projects like RealOne have the hallmarks of success, but only time will tell. Also, alongside the battle to provide a user-friendly, secure-music system is the battle to win over the jaded minds of listeners accustomed to free music.

‘The limitations [of programs like RealOne] turn out to be your expectations," says RealNetworks' Leslie Grandy. "Until you realize all the things those other experiences weren't, then you see that it wasn't the heavenly experience we all claim in our memory. I think about all the times I used to go to Napster and read the megabytes of every song I wanted to consider to make sure I got the complete song, and all the times I was completely hosed that I didn't get it, or when the quality wasn't what it was supposed to be, or when it wasn't even the same song I expected. The amount of time I wasted doing that wasn't worth the fact that I paid nothing for the service."

The More Things Change . . .

Piracy probably won't go away. You can use ripping utilities to record online radio streams (some at CD-quality), and then chop them into song files. Connect the Line Out port from a CD player to the Microphone port of a sound card and start recording. It's not rocket science, and pirates are sure to find more subtle means of circumventing the system. As EMI's Samit says, "We're not protecting government secrets here. We only want to keep most people honest most of the time."

The recording industry can crush the current batch of Napster clones but others will appear. There will always be Usenet, IRC, and all the pre-Napster means to swap files. People have always found ways to pirate music and always will. It seems likely, though, that consumers would respond positively to record companies offering "must-have" features as incentives, showing buyers more value for their money than they could realize through file swapping.

Napster changed all the music rules, and record labels will have to work harder for their money. Consumers will likely object vehemently to unfair solutions but pay willingly for sensible ones. CPU

by William Van Winkle

The Main Players In Legit Digital Music

The Big Five: Record label companies BMG, EMI Recorded Music, Sony Music, Universal Music Group, and Warner Brothers dominate recorded music. Independents, such as Zomba, are nothing to sneeze at, but the Big Five decide how music gets distributed.

Microsoft (www.microsoft.com): Many reviewers consider the Windows Media platform the best all-around solution for audio and video compression, plus the platform incorporates a well-respected DRM (digital rights management) technology on par with any competitor's. Microsoft has at least a year's lead on Real for getting its DRM platform to market, which is partially why so many devices support WMA and not Real.

MusicNet (www.musicnet.com) and **pressplay (www.pressplay.com):** The two competing back-end licensing platforms fueling this year's deluge of secure-music subscription services.

RealNetworks (www.realnetworks.com): Real is positioning itself as a digital media solution to both consumers and service providers, a smart two-pronged advance it appears Microsoft isn't currently addressing. If Real can advance its codecs to match or surpass the efficiency in Windows Media Audio 8, Microsoft will have true reason to worry.

RIAA (www.riaa.org): The Recording Industry Association of America is the legal body that represents the Big Five and is charged with bringing down music piracy. ▲

50 Napster Replacements

P2P Will Not Die

Depressed about the current state of Napster? After suffering countless lawsuits and being bought out by one of the world's major publishing houses, Napster has been forced to clean up its act, filter out copyrighted music, and start a subscription service in order to make ends meet. But fear not, file-fiends.

Just because relentless lawsuits and, worse, corporate suits have declawed Napster, the media-file-sharing party doesn't have to be over for the rest of us. As Napster slowly slips behind the paid subscription wall, you might sample some of the scores of alternative P2P protocols file swappers now use to trade everything from MP3s to full-length feature films.

Here, then, is *Computer Power User's* directory of file-sharing programs currently available online. Look for the occasional "Spyware Alerts" we have attached to programs that are known to install pesky third-party adware programs, such as Gator, on your hard drive. This type of spyware monitors your online behavior and then feeds you targeted ads in addition to the ones you already see while browsing the Web.

Too many choices? Read our next article, File Swapping Top Five on page 56, to zoom in for a closer look at the best file-sharing clients out there.

To read more about each of these programs, check out the full Web version of this article at www.smartcomputing.com/cpumag/feb02/replacements.

Aimster: www.aimster.com

Amster: home.worldonline.dk/~jlaur/amiga/amster

Audiogalaxy: www.audiogalaxy.com Spy Ware

AudioLocator X: www.audiolocator.com

BearShare: www.bearshare.com Spy Ware

BeNapster: benapster.sourceforge.net

Bitbop Tuner: www.audiomill.com

Bodetella: www.felmlee.com/bodetella

Carracho: www.carracho.com

Direct Connect: www.neo-modus.com

eDonkey2000: www.edonkey2000.com

File Navigator: www.filenavigator.com

Friskit: www.myfriskit.com

Furi: homepage.mac.com/macgnutella/downloads.html

Gnewtella: gnewtella.sourceforge.net

Gnotella: www.gnotella.com

Gnucleus: www.gnucleus.com

Gnut: www.gnutelliums.com/linux_unix/gnut

Grokster: www.grokster.com

Gtk-Gnutella: gtk-gnutella.sourceforge.net

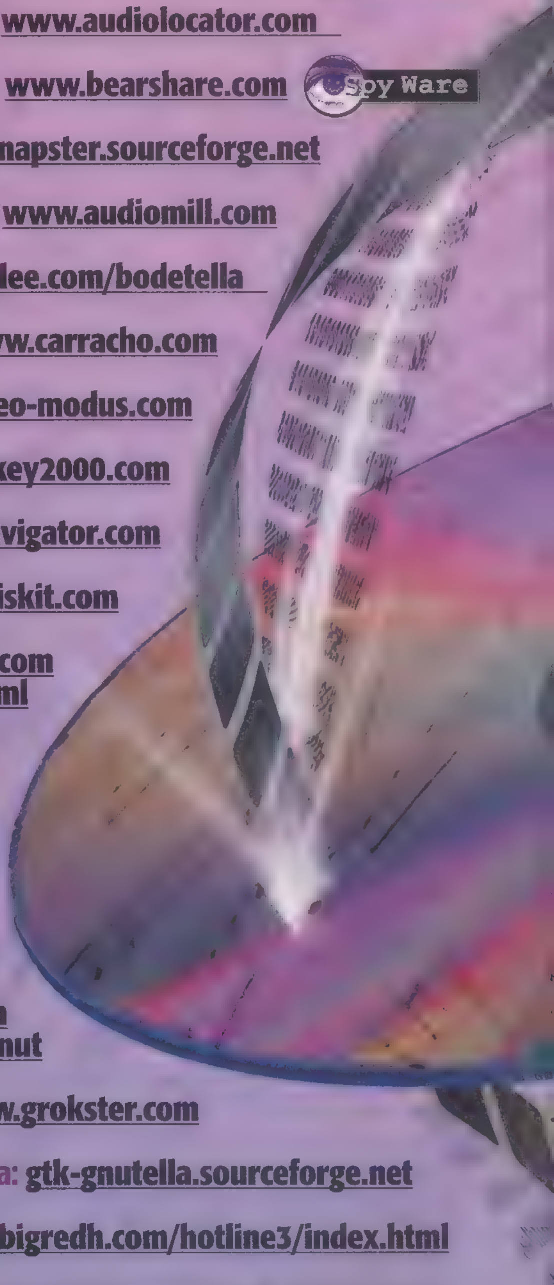
Hotline Connect: www2.bigredh.com/hotline3/index.html

Hagelslag: tiefighter.et.tudelft.nl/hagelslag

iMesh: www.imesh.com

iSwipe: www.hillmanminx.com

KaZaA: www.kazaa.com Spy Ware



LimeWire: www.limewire.com Spy Ware

Linux Napster Client: www.gis.net/~nite

Mactella: www.cxc.com

Mojo Nation: www.mojonation.net

Morpheus: www.musiccity.com

MyNapster: www.mynapster.com

MyGnut: www.bebits.com/app/1266

NapAmp: napamp.sourceforge.net

Napigator: www.napigator.com

NetBrilliant: www.netbrilliant.com

Newtella: www.newtella.com

N-Tella: www.friedcat.co.uk

Rapigator: www.rapigator.com

Rapster: www.macnews.com.br/overcaster/rapster.html

Riscster: riscster.iconbar.com

Scour: www.scour.com

Smirck: www.smirck.com

SongSpy: www.songspy.com

SwapNut: www.swapnut.com

Swaptor: www.swaptor.com

TekNap: www.teknap.com

Toadnode: www.toadnode.com

Universal Media eXchange: sourceforge.net/projects/umx

WebNap: webnap.sourceforge.net

WinMX: www.winmx.com

by Steve Smith

File Swapping Top Five

Leaders Of The Napster Replacement Pack

The decline of Napster as the center of the online MP3 universe was less the end of the file-swapping phenomenon than the beginning of its next stage. Rather than scrambling to find alternatives to the weakened Napster, file swappers are now suffering an embarrassment of riches. There are more P2P client options than anyone could evaluate comprehensively, even us.

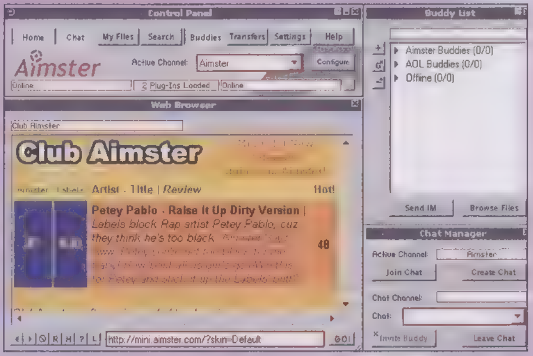
Nevertheless, here are our five best bets. This short list of P2P programs represents a range of technologies, clients that use Napster and Gnutella protocols, and some of the newer file-swapping approaches from FastTrack that emphasize multiple file types. These programs are also among the most popular and highly rated downloads online. Most of these programs are free, so it's no problem to see if you agree with the millions of file swappers out there. Let the swapping begin.

Aimster

Version 3.22
www.aimster.com

Aimster is among the most user-friendly file sharing programs available. But PC users must install it in two parts. Aimster first installs a Guardian Aimster program that runs in the Taskbar; only when you try to do a search or other activity does the full program install itself.

The interface is a model of integration. Search, instant messaging, and chat are in separate windows on the same console, so Aimster is especially well-suited to users looking for peer-to-peer communities. Click the Join Chat button, and you get a list of 20 or more active discussions at any time of the day. You can even add IM buddies from within the Aimster network or AOL. At just about every turn, the program makes file sharing easy enough for Mom to operate but robust enough for the more jaded teen geek in the house. It even has a Web browser window built in.



Petey Pablo . Raise It Up Dirty Version |
Labels block Rap artist Petey Pablo, cuz they think he's too black

Aimster features online buddy and chat windows for cultivating a file-swapping community and a browser window built into the client itself.

Aimster lets you search all media files, from music to video, applications to documents. By querying "Star Wars" across all file types, we got everything from theme songs to trailers to images to Web pages. Aimster even found a recording of Bill Murray's hilarious lounge lizard rendition of the movie theme. In most cases, we saw more than 100 hits on each of our queries, including "Robin Williams," "Garbage," and "Tommy Dorsey." For recordings, the results window reports both the bit rate and frequency at which the track was made, whose server or PC has the file, and the speed of its connection. And unlike many P2P clients, this one delivers usable results quickly. The searches are lightning fast, and we found that a very good percentage of the hits reflected active, downloadable files. You can even preview music tracks before they finish downloading, a great safeguard against waiting for a poorly recorded or mislabeled file.

Aimster proved to be effective as both a starter P2P client for the uninitiated and a well-integrated platform for establishing online file-sharing communities. This is one program that serves two masters well.

Audiogalaxy

Version 0.608W
www.audiogalaxy.com

While Audiogalaxy is not the easiest or best integrated of the P2P schemes out there, music fans who want thorough searches of what is available from other file-swapping servers will want to try it. The program runs an Audiogalaxy Satellite program from your Taskbar that monitors any download activity and starts up the heart of the file-sharing system, the Audiogalaxy Web site.

Unlike most P2P clients, many of your searching and file transfer duties are handled on the site rather than through the downloadable client software. Once on the Audiogalaxy site, users can jump to a large selection of hosted music artists, specific genres, and member groups. For $2.95, you can upgrade to a Gold membership in order to get an upgraded Satellite client, as well as access to dedicated servers that optimize the download process. The interface is not as swift and flexible as the clients that rely mainly on downloadable software, but it does contain one of the strongest P2P search engines we have seen.

Audiogalaxy is an all-music search service; we were impressed by the depth and detail of its search results. Whether it was a Tommy Dorsey swing tune or the latest from Garbage, this system delivered a torrent of file options. Once you choose a track, Audiogalaxy lets you set a minimum recording quality the service should find and download. The satellite handles the file transfer, but the site monitors the

It Ain't Just MP3s Anymore

The peer-to-peer file swapping craze may have started with Napster and MP3 music tracks, but in short order, users have dared to share just about everything, from image files and applications to full-length movies. While Napster limited itself to the MP3 format, subsequent file-sharing protocols have not. Morpheus (www.musiccity.com; see review in main article) made movie swapping infamous, but it is based on the FastTrack technology that also powers two functionally equivalent programs, Grokster (www.grokster.com) and KaZaA (www.kazaa.com).

All three clients have online cinemaphiles in mind, with specific search routines for film, a results screen that tells you a film's running time and screen resolution, and a built-in movie viewer. But the FastTrack clients are not alone. We found that most of the Gnutella-based programs also did a fine job harvesting video clips. For instance, LimeWire performed almost as well as Morpheus, netting us more than 10 sources for the "Harry Potter" trailer. If you think the record industry raised a fuss about file sharing, just wait until you see that craggy-faced head of the MPAA (Motion Picture Association of America), Jack Valenti, get his panties in a bunch over this. ▲

status of your download queue and even lets you load your designated music player and run the track from your hard drive once it is downloaded.

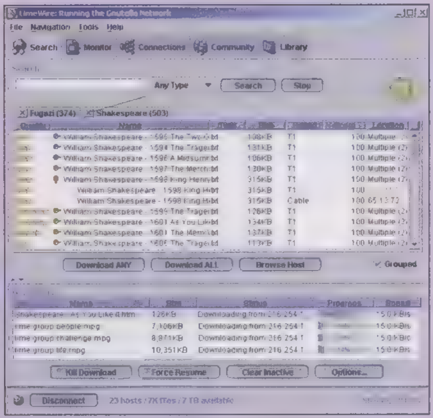
One drawback to these extensive search results is a lot of unsuccessful download attempts. The site handles many download requests at once, but we found that many went unanswered by the network of peers in the system. And Audiogalaxy does try to install the Gator program on your PC. You can opt out of Gator, but you'll have to stay alert for the necessary dialog box during the installation process. Despite these irritations and a bit of a kludgy Web interface, Audiogalaxy delivers where it counts: files, files, and more files.

LimeWire

Version 1.8c
www.limewire.com

Most of the P2P clients that use the Gnutella technology for searching other PCs on the network seem to have been written *by* tech geeks, *for* tech geeks. They are more concerned with showing users all of the complex background operations that go into file sharing than they are in making the process simple and clear to everyone. LimeWire is a notable exception. It has one of the most polished and clear consoles available, and it sports some unique features. But be warned: LimeWire tries to install Gator.

LimeWire requires the latest version of Java, which LimeWire installs on your system if necessary. The program's simple tabbed console gives easy access to search functions, a library (which also launches any downloaded files), and some connection monitors. The search options are the real stars here. In addition to scanning for the usual music, video, and application file types, LimeWire has specific filters for book-related queries, radio stations, and even realty information, although we had trouble getting results from these offbeat searches. What does work well are the multiple, simultaneous searches, which let you run many different queries at once, each in its own tabbed window. You can keep feeding different queries into the search box and LimeWire opens new tabs, letting you click back and forth among them to check on the progress of each search.



LimeWire delivers an exceptionally well-organized search result while it also performs searches on several other queries.

LimeWire delivered a deep trove of search results: hundreds of hits on a search for Garbage tunes, as well as scores on our testbed of queries for Robin Williams comedy tracks, "Star Wars" trailers, and Tommy Dorsey instrumentals. Even better, we found that LimeWire was exceptional in finding links that actually worked and succeeded in downloading the search hit. This is a real problem for many other P2P clients, especially Gnutella programs, so this feature alone makes LimeWire one of our favorites.

We also love the program's customizability. A superb options menu lets the user adjust connection speeds, set limits on the number of simultaneous downloads or searches LimeWire performs, decide how the search results should be ordered, and choose what filters to apply to search results or file hosts that the program queries. Deceptively simple but extremely effective, LimeWire is a standout Gnutella client. It is also available for all the major operating systems: Windows, Linux, and Mac.

Morpheus

Version 1.3.3
www.musiccity.com

Published by MusicCity, the Morpheus P2P client has become hip and famous in recent months for its ability to find and download movie clips online. Legend has it that film nuts have been able to locate pirated versions of some full-length features even before they hit the local multiplex. Combine Morpheus with enough high-speed bandwidth and hard drive space, and you have the movie industry's worst nightmare: a Napster for Hollywood.

The truth is that Morpheus is much more than a movie locator, although it does have a built-in video player. It was designed to swap all types of documents, programs, and multimedia material, and it even accommodates publishers' copyright protection schemes. Unlike the Napster and Gnutella clients, Morpheus is based on a newer file-sharing protocol from FastTrack that is starting to crop up in other similar clients such as Grokster. Morpheus installs easily and has a simple, tab-based interface for running searches of all media types, launching many of them in an internal player (the Theater window), and monitoring upload and download traffic.

Morpheus works well, if more slowly than some of the other clients out there and with somewhat slimmer search results. It delivered about half the hits on Tommy Dorsey we saw with Aimster and Audiogalaxy but performed at least as well as the rest on Robin Williams and "Star Wars" queries. The results screen is hampered by too many information columns that make you scroll and scroll horizontally. Morpheus does deliver a remarkable amount of information about the files it finds, from estimated download time and album sources for audio to the screen resolutions used to record the film clips you can find.

Morpheus does not have the slickest interface around. For instance, a simple search can require several clicks to get all the options right. But the FastTrack technology behind this new P2P phenom is catching on among users who want to swap a broad range of content types. Alas, Morpheus wants to run Gator on your system when Morpheus installs.

WinMX

Version 2.6
www.winmx.com

Of all the top-rated and most commonly downloaded P2P clients, WinMX is the one most targeted to advanced file swappers, the users who like to monitor all aspects of the network's performance and peer inside others' file libraries. WinMX is also the one program in our group that accesses both traditional Napster servers and the newer OpenNap network of servers, which carry all audio and video media. The result is a detailed and robust client that succeeds in locating a massive number of files.

WinMX asks for some firewall and user connection information upon installation. We were glad to see that WinMX doesn't try to install any spyware. The program uses a simple topline Taskbar that telescopes out into much more detailed functionality for server maintenance, searches, downloads, and chats. The search page is among the most versatile we have used. You can enter multiple search terms and run each new search in a separate window.

A hunt for "Star Wars" video clips turned up 205 hits, while Robin Williams called up 99. We found an astonishing 628 file hits on a search for Garbage MP3s. With this kind of raw searching power, it's good that WinMX has so many ways to filter the results. A lengthy drop-down menu designates specific bit rates to include, and you can even ping all the servers you have hit in order to determine which would be the most responsive for downloading. As with any of the programs that deliver extensive search results, WinMX included many servers that were busy or disconnected, so finding the files that could really be downloaded right away was a bit of a challenge.

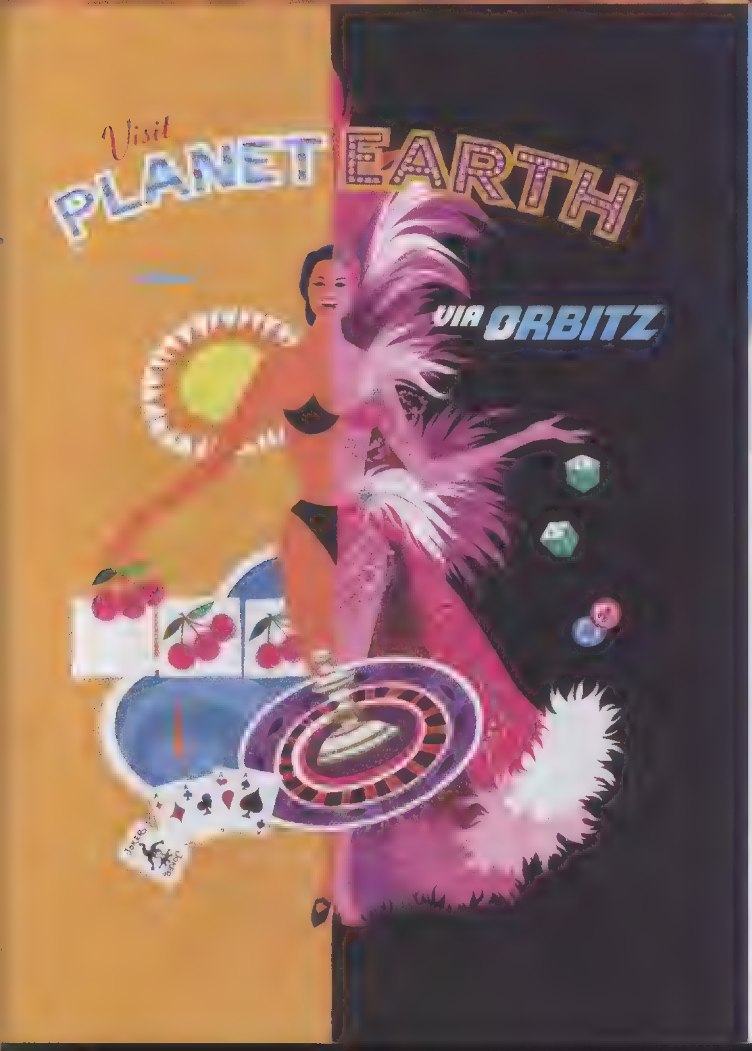
In WinMX, you can construct a community of fellow swappers out of this network of anonymous servers. You can browse another user's shared drive by right-clicking the server name that appears in the search results. This is a great way to locate people with shared tastes and make chat connections for future file swapping. In fact, WinMX makes it very easy to cultivate a community by adding any username found in search results to a hotlist of common chat partners. Although less elegant than some of the other P2P offerings, WinMX is a great option for the technically minded who like to have total control over their file-sharing experience. CPU

by Steve Smith

Puttin' It To The Man: XP Gets Hacked

Copyrighted songs aren't the only pirated material making their way around the Web. In fact, when Microsoft announced that it was protecting its new Windows XP with an "Activation Code" that would keep users from installing a single copy on multiple machines, it might as well have drawn a target on itself. Bees to honey, flies to . . . well, trash, the hacker underground took up the challenge of cracking XP before it was released.

A week before WinXP hit U.S. stores in late October, pirated copies of the final code began showing up in the notorious software stall of Bangkok, complete with stolen Activation Codes that permitted multiple installations from the same disc. Even more humiliating for Microsoft, a crack appeared on the Web within hours of XP's Oct. 25 launch that strips the copy protection scheme from the OS entirely, according to British digital rights management firm, BitArts Lab. Hacked versions of XP itself can now be found at most of the pirated Warez software sites around the Web, if you can make it past the relentless assault of pop-up ads and porn come-ons these sites wage on your PC. ▲



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The Next Great Thing?

Downloading Music Is Just The Tip Of P2P's Iceberg

Unless you've been in a mountaintop survivalist retreat the past few years, you have heard of and probably used Napster (www.napster.com) or a similar app to download MP3s. Napster is probably the most oft-cited example of a P2P (peer-to-peer) application, which is drawing some attention as being possibly the most revolutionary 'Net development since the Web emerged from Gopherspace.

Although music sharing gets most of the P2P press, there's a lot more activity flying below the general public's radar. Currently, the most successful uses of P2P fall into four categories: distributed computing, instant messaging, distributed search engine/file-sharing, and workgroup collaboration.

An Ever-Evolving Concept

For all its hype, P2P isn't an easy term to pin down. P2P is two servers conversing. It's also two systems running the same head-to-head game. Historically, P2P networking has been defined as two or more computers sharing resources, such as files, apps, and peripherals. Nodes on a P2P network can act as both client and server depending on the task, unlike today's predominant networking model where the majority of resources are concentrated on servers and then doled out to passive client machines.

But P2P is about more than network architecture. It's also about tapping into a vast network of decentralized PC resources. The ideal is that P2P will deliver unprecedented computing power and collaboration to everyone, significantly changing how we use computers. The following are P2P models in action:

Distributed computing. Besides music sharing, P2P computing has been most successfully used in DC (distributed computation) projects. Although not P2P in the strictest sense (the nodes can't communicate directly with each other), DC is a close cousin, harnessing untapped computing power on the Web to let machines tackle tasks far bigger than one machine can manage alone.

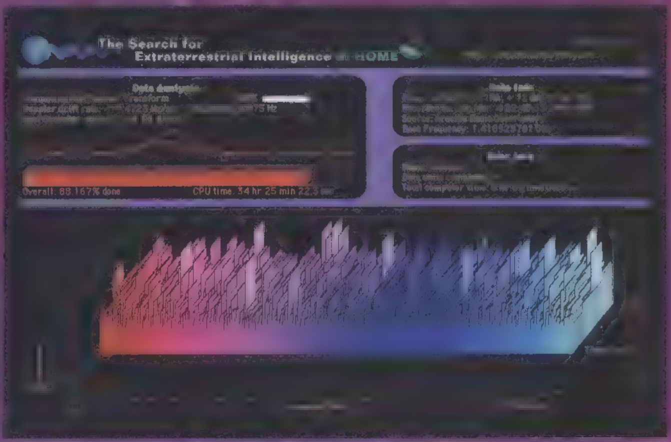
The Performance tab in the Windows Task Manager reveals that more than 90% of CPU cycles are spent idle. DC projects use the unused power to process large amounts of data quickly and cost-effectively. Most of the biggest DC projects have been scientific and/or educational in nature, although groups such as United Devices (www.ud.com) are harnessing DC for commercial projects and groups such as distributed.net are solving complex mathematical challenges.

Perhaps the granddaddy of DC ventures is SETI@home (www.setiathome.ssl.berkeley.edu), a small client-side screen saver used to process a dollop of radio satellite data in "The Search for Extra-Terrestrial Intelligence." When your computer is idle, the screen saver starts crunching. When it finishes with one dataset, SETI@home uploads the results and downloads another set to process. More than 3.3 million users have participated in this project, contributing more than 789,000 CPU years so far.

File sharing/distributed search engines. Despite Napster's legal woes, file sharing is still one of P2P's thriving arenas. Napster was a hybrid P2P system, maintaining servers that catalogued available MP3s and then directed incoming searches to machines holding the requested files. Conversely, the Gnutella system is a truly decentralized architecture. Machine A talks to B, through B to C and so on, allowing A to download directly from C or even Z. This design helps avoid potential server overload.

Note that file-sharing P2P systems are capable of searching for and transferring any type of digital file, including documents, video, images, and even system drivers. What Google does for Web pages, distributed search engines do for individual files.

A killer example of this "servant" software is LimeWire (www.limewire.com). This very intuitive Gnutella front-end app lets you search by file type, add category-specific information to shared files, chat with active system users, and play MP3s in an integrated player as you


The Search for Extraterrestrial Intelligence at HOME
Overall: 88.167% done
CPU time: 34 hr 25 min 22.3 sec

Is there extraterrestrial life out there? The SETI@home project is trying to answer that question using a form of P2P networking. The project gathers your computer's unused resources, along with those of millions of other systems, to crunch data. A colorful screen saver tracks the progress.

Learn More

Many sites provide information and resources for P2P networking. Try these for starters:

- **OpenP2P.com; openp2p.com**
- **Peer to Peer Central; peertopeercentral.com**
- **P2Ptracker; p2ptracker.com**

download them. The powerful program heralds future P2P file-sharing systems, albeit without any rights management.

Instant messaging. In the Internet's bluehair days, chatting in real-time meant you needed to master a clunky Unix command-line program, such as Talk. This changed in 1996 with ICQ (www.web.icq.com). Suddenly, it was simple to know when others were logged on and to initiate conversations with them. IM is now an everyday part of the Internet. Messaging clients now feature conferencing, video, and audio.

IM, like many P2P apps, is a hybrid; servers maintain lists of network users and control much of the messaging traffic. Still, the technology's soul is P2P, and programs such as Aimster (aimster.com) and Fatbubble (www.fatbubble.com) are adding P2P file-sharing capabilities to their frameworks.

Workgroup collaboration. With collaborative P2P tools, group members can self-organize and interact in real-time in highly secure shared spaces. The software (also known as groupware or peerware) lets users do collaborative conferencing and editing of a document, plus it replicates and stores resources locally so group members can access them offline, too.

Groove Networks (www.groove.net) is an excellent example of this P2P app, which is being tested by the U.S. Joint Forces Command as a possible solution to help military personnel share information and plan strategies on the fly.

"Each of these emerging, decentralized technology areas addresses a specific business problem," says Ryan Hoppe, Groove Networks communication manager. "Distributed processing seeks to tap the unused computing power on disparate desktops spread across a network. Distributed storage and network services provide users with new ways of finding and sharing valuable knowledge assets residing on individual desktops, not on centralized servers. And decentralized collaboration software, like Groove, allows dispersed project teams to self-organize, securely, across enterprise boundaries."

Why P2P Must Be

P2P's core strength is its ability to link users in continually more content-rich ways. Whether this is best achieved with centralized, portal-type approaches or decentralized methods remains to be seen. Jack Corrao, spokesperson for Inetcam (www.inetcam.com), which specializes in P2P desktop streaming video, says the decentralized architecture provides a more one-on-one potential.

"Portal or community apps are a novel concept, but the streaming P2P market is exploding. With portals, it takes forever to find who you want to talk with, and this simply doesn't fly in a business environment. When you get away from the portal model, you have the ability to control your material, who gets to use it, and at what speed. That will be critical to anyone distributing original content."

Mike Grotta, senior vice president at consulting firm META Group, predicts a more diminished role for P2P in the business space, with P2P apps functioning "only as a hybrid extension of existing collaborative suites, [although this] will force suites to change." Perhaps soon FrontPage will carry native support for Web designers to find one another to collaboratively build sites from anywhere.

Today, the secret to competitive success lies as much in project efficiency as in product quality. Master P2P today and you'll be working smarter (and playing longer) than your rivals tomorrow.

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by William Van Winkle

P2P: Upsides & Downs

P2P provides several benefits that give it potential advantages over today's prevailing client-server network model. A few compelling benefits include

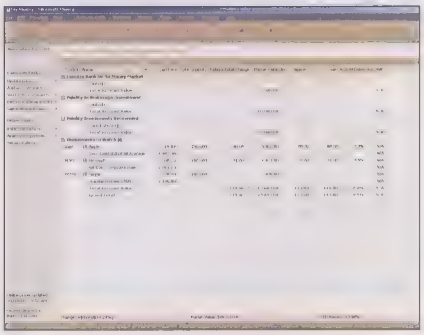
- **Decentralization for greater network stability. How often are you unable to get information because a Web or mail server is down? Because P2P systems are comprised of many nodes (many containing copies of the same information), the network can still function and information remains available if a node goes down. This sort of post-nuclear disaster application is what the Internet was originally designed for.**
- **Availability to a variety of hardware devices. As more varied types of hardware become part of the Internet, P2P provides a great way for them to communicate. For example, PCs, wireless phones, tablets, and PDAs can all take advantage of IM capabilities.**
- **Easier real-time collaboration. Whether your co-workers are down the hall or Down Under, good tools for real-time collaboration on computer-based projects are in great demand. A P2P system, because it doesn't depend on a server for administration, provides remote team members direct access to shared files. You're at a computer. It's on. You're ready to work.**

P2P isn't perfect. The technology has potential disadvantages, including:

- **Peer-to-peer computing, by definition, makes your machine accessible to others on the Internet. Good software minimizes your risk, letting networked users access only areas you specify. But security breaches happen, and crackers are always looking for a way in. Poorly executed P2P can leave your data vulnerable.**
- **Access, or lack thereof. P2P only works when network users are logged in. If you need a file residing on a limited number of nodes, and none of them are available, you're stuck.**

Money 2002 Deluxe vs. Quicken 2002 Deluxe

The Top Personal Finance Software Titles Go Head To Head



Microsoft Money lets you choose various views of your portfolio. Here we see an investment portfolio with an eye on performance.

Intuit and Microsoft have been going at it for years, each trying to outdo the other in the quest to capture the personal finance software crown. Despite Microsoft's threats to bury Intuit, Intuit kept advancing Quicken, adding new features and services and leaving Microsoft to play catch up. But, perhaps overconfident, Intuit recently stumbled slightly: Quicken 2001 offered little improvement over earlier versions. This tactical error gave Microsoft Money developers a little breathing room and a chance to body slam their competitor in the ring of public opinion. Here we size up the latest version from both contenders to determine the current champ.

Microsoft Money 2002 Deluxe

If you're new to using finance software, creating accounts can be a daunting task. Money would earn our Wise Wizard Award (if we had such an award) for the best setup routine for new users. The Setup Assistant uses simple questions to take you step-by-step through the process of creating accounts.

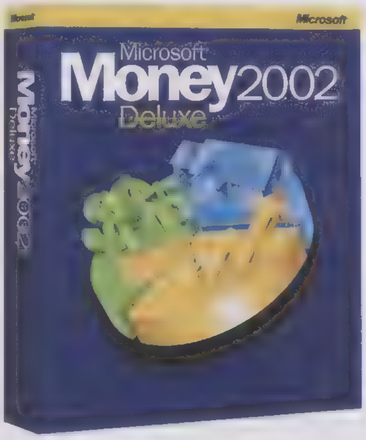
First, you'll configure Money so it can connect to the Internet, retrieve stock quotes, access online banking services, and use other Internet features. Sounds easy enough, and it is, but there's one catch: Internet access requires a .NET Passport account. (If you don't have one, Money is supposed to help you get one.) This requirement marks the first fall in the match between the financial titans.

When we didn't have a Passport account, it launched our browser and took us to a Passport member page, where we could do almost anything with a Passport account except create one. For lack of anything better to do, we clicked the Sign In button and discovered a small-print notice on the login screen that said if we didn't have an account, we could create one by clicking some minute text.

While irritating, this gaffe wasn't troublesome enough to make us forget how smooth the rest of the Money account setup process is. Money asks how many accounts you want to set up for such things as checking, savings, money market, credit cards, and investments and then walks you through the setup process for each one. This is a far better method than the one Quicken uses, where you set up one account at a time and then repeat the process for each new account.

Next, Money asks for information about the routine bills you pay, then creates your accounts. You're now ready to use Money to manage your financial empire.

Web wise. Money's general interface resembles a browser. From the Home page, which you can customize to display the information you need, you can access all areas of Money. Money's Web savvy reaches new heights with its Background Banking system. It can download bank statements, stock quotes, or other information from your financial institution at the update interval you set. You don't need to keep Money running to nab your latest financial data; just leave your computer on and connected to the Internet. Background Banking ensures you're always looking at the most current information for your accounts. If you're not fond of any system having unrestrained access to your banking accounts, you can turn this feature off and manually perform online updates whenever you want to check your loot.



Money 2002 Deluxe
$64.95; $20 mail-in rebate
Microsoft
(800) 426-9400
(425) 882-8080
www.microsoft.com/money

And the Web integration doesn't stop there. Money includes a new feature called MoneySide, which is really an Internet Explorer bar that provides financial information as you work or browse the Web. Want to know your current credit card balance before making an impulse buy at eBay? The info is available in the MoneySide IE bar, as is most of your other account information. MoneySide requires your Passport account info before it will display any information. Keep your password a secret, and other household members won't be able to see your account balances when they browse the Web.

Investment weak. Money's investment tools are still weak compared to Quicken. They're geared more toward a casual investor who wants to know how her 401(k) is doing than toward a mogul trying to decide whether to invest on margin or analyze investment purchases. If you have active investments to manage, Quicken is still the champ when it comes to investment and analysis tools.

Money also still comes in second when tax time rolls around. Microsoft enhanced Money's integration with Kiplinger TaxCut, but having the best integration with TaxCut

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

doesn't help if you prefer to use the leading tax program, Intuit TurboTax.

Quicken 2002 Deluxe

Quicken 2002 adds a little zip to the account setup process compared to earlier versions. The process starts with a simple set of questions. Are you married? Do you have children? Do you own a house? Quicken uses this information to set up the account types you'll need but fails to use this data to customize the rest of the program, requiring you to later answer some of these questions again. Money is much better at this task.

Quicken has a built-in video to guide users through account setup and learn to use the program's features. If you're new to Quicken, pause here to review the video; otherwise click Done to see the account setup page.

The easiest way to manage your personal finances!
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$59.95; Previous Quicken users save $20 with mail-in rebate
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www.quicken.com

Sink or swim. Quicken uses a modified step-by-step process for creating accounts. Unlike Money, which holds your hand through the entire process, Quicken tosses you into the pool, confident that you know the types of accounts you need and will pick the correct ones. You can set up accounts in the following categories: Banking, Investing, Property and Loans, Bills and Scheduled Transactions, and Paycheck. Complete the setup process, and you're ready to use Quicken to manage your finances and get working on that plan to retire early.

Quicken's general interface resembles a Web browser. You can configure the main page, called My Finances, to display your favorite Quicken tools and data views. For example, if you need frequent reassurance, you can permanently display a net worth graph on the My Finances page. Quicken also features secondary pages called Centers, with similar services grouped onto common pages, including a Banking Center, Investment Center, Property & Loan, Tax Center, Planning Center, and Reports & Graphs.

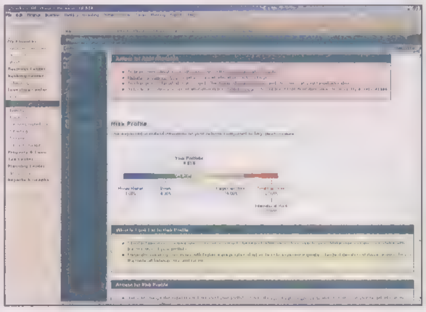
Power tools. Quicken offers a wide range of online services, including online banking and the ability to download and reconcile bank statements, a task we always dread. Quicken makes this task a little easier, and even unavoidable, if you choose. But it's the investment tools that really make Quicken shine. Our favorite is the Portfolio Analyzer, where you can check your investment portfolio's performance, including average annual return and best and worst performers. Asset Allocation lets you see the expected risk and return on your combined portfolio; Risk Profile uses standard deviation to determine the possible risk and return on your investments, current holdings, and tax implications, including capital gains and short- and long-term implications for tax planning. For those of us living on a budget (or who should be living on a budget), Quicken's Budgeting tool is one of the easiest to use. You'll find it in the Planning Center, along with other tools that can help you pay for college, reduce debt, buy a house, or afford the latest gadget.

When it comes to tax season, nothing beats Quicken and its complete integration with TurboTax. You can download an entire year of financial data into TurboTax and reduce or eliminate the amount of data entry needed to get your tax forms in order. While you will only use this tool once a year, it's one of Quicken's best features and is used at the one time you don't need to be hassling with moving or reconciling data.

The Envelope, Please . . .

This was a tough call. Money has the advantage over Quicken when it comes to setting up accounts, and we like Money's Background Banking service. But Quicken stays in the game with its investment tools and the best possible tax integration.

Although not a knockout, we have to give this win to Quicken. Money's ease of setup is attractive for first-time users, but because setup is a one-time event, it's not a strong enough feature to offset Money's lack of integration with TurboTax or its basic investment tools that, while serviceable, are not enough to create the next stock market millionaires.



Using Quicken's Risk View, you can check the risk level of your investments at a glance.

We'd have to declare the day-to-day use of these programs a tie, although we did lean toward Money's better Web integration. But when push comes to shove, Quicken's investment tools and tax integration hold it up as the winner. CPU

by Tom Nelson and Mary O'Connor

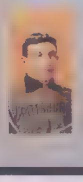
At press time, Intuit released TurboTax Deluxe For Tax Year 2001. See what's new in this latest version at www.smartcomputing.com/cpumag/feb02/turbotax

Infinite Loop

Source: eBay

The two most expensive items ever sold on eBay:

Gulfstream II business jet (Aug. 16, 2001) for $4.9 million

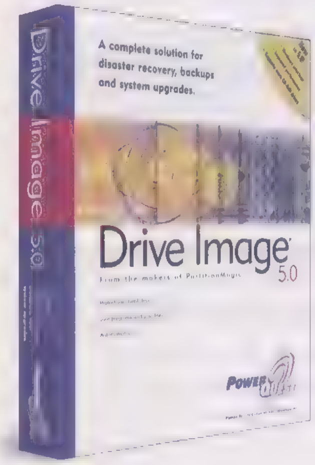


T206 Honus Wagner baseball card (July 15, 2000) for $1.265 million

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

by Kevin Savetz

Drive Image 5.0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CPU CPU

Drive Image lets you create an image of your hard drive—that is, a single file that contains a copy of an entire drive partition or multiple partitions. You can think of a drive image as an exact snapshot of what's stored on your hard drive, which can be useful for creating backups or moving data from one hard drive to another.

The program runs on Windows 95/98/Me/XP/NT/2000 Professional but doesn't support NT Server or other server OSes. It can make images of FAT, FAT32, NTFS, HPFS, and Linux partitions and support hard drives up to 80GB.

Drive Image's simple interface offers three options. The create image function builds a drive image. The restore image function turns that image file back into individual files. The disk-to-disk copy tool clones a partition, copying the contents from one hard drive to another.

There are two levels of compression for creating an image to reduce its size. Even at the higher compression level, the program is fast, copying and verifying 1.65GB of data to a not-so-fast hard drive in just over 6 minutes. You can password-protect a drive image and split an image into multiple files to ensure it will fit onto removable media.

The main Drive Image program is a DOS application. To run it, you must reboot to DOS mode. When it's done, you have to wait for Windows to load again. Although Drive Image is a graphical application that's easy enough to use, all that rebooting wastes time.

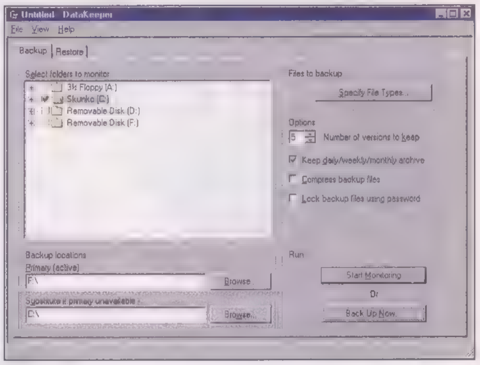
You may have to jump though a few hoops to use Drive Image with removable media. According to the program's users manual, an internal Zip drive should work only after manually editing configuration files. PowerQuest's support Web site provided an easier method that proved effective. However, we couldn't get the program to work at all with an Iomega Peerless USB-connected removable hard drive.

The Drive Image package also includes QuickImage, a Windows front-end that we frankly don't quite understand. You can use QuickImage to define an image you want to create or restore, but after you do so, the program needs to reboot to DOS and launch Drive Image to do its dirty work. To make matters worse, QuickImage's interface isn't intuitive. The graphical DOS interface is easier to use. You can use QuickImage, however, to schedule creation of images. For example, you can set the program to create a backup image every day at 3 a.m. or when you shut down the PC.

After you create a drive image, you can use Image Explorer, a Windows application, to peruse the files stored in that image with a familiar file navigation interface. You can use Image Explorer to view documents buried within a drive image, but you can't run applications stored in the image. Image Explorer makes it easy to restore a file or folder by dragging the item to another drive. You can also drag files between images to copy them.

When you don't need to make an image of a whole partition, but rather just important files, the package includes DataKeeper, a backup program that works in Windows (although it doesn't support XP).

DataKeeper can create a one-time backup or monitor changes to your data files, automatically making backups of everything you save. By default, it won't monitor changes to applications and system files, just your data, which is a nice touch. It can store as many as 99 different versions of each file in case you need to recover an older version. Unfortunately, the program opens its obtrusive window every time you reboot, instead of hiding quietly in the System Tray, which would be a more elegant option.



Number of versions to keep: 5
☑ Keep daily/weekly/monthly archive
☐ Compress backup files
☐ Lock backup files using password
Primary (active): F:\
Substitute if primary unavailable: C:\

The two compression levels that Drive Image offers for copying and verifying data are fast.

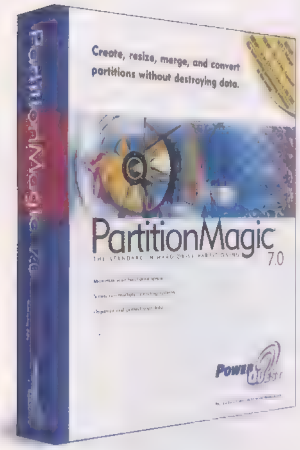
Drive Image does what PowerQuest claims it will do by creating drive images, restoring them, and cloning hard drives. If those are tools you need and you can live with the program's limitations, Drive Image will do the job.

> After you create a drive image, you can use **Image Explorer**, a Windows application, to peruse the files stored in that image with a familiar file navigation interface.

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Kevin Savetz

PartitionMagic 7.0



PartitionMagic 7.0
$69.95 ($49.95 upgrade)
PowerQuest
www.powerquest.com

In a world where 80GB hard drives are common and someone, somewhere seems to release a new operating system every week, it makes sense to partition your hard drive.

The problem with basic partitioning utilities, such as FDISK, is that once you create a partition, it's written in stone, and you can't change it without destroying the data it contains. PartitionMagic makes drive partitions more fluid. With it, you can create, copy, move, resize, merge, and split partitions.

The program does these tasks without damaging your data (although the users manual strongly and repeatedly encourages you to make a backup first). For example, you can take a few gigabytes from an oversized Linux partition to make room for a new Windows XP partition without losing a byte of Linux goodness.

PartitionMagic handles FAT, FAT32, NTFS, and Linux partitions. The program supports hard drives of up to 80GB. If fate has burdened you with a larger drive, look elsewhere. The program does a good job of providing powerful features for experts while keeping beginners from shooting themselves in the foot. For example, you can use a wizard to tweak partitions or do it by hand by controlling the tiniest detail of each change. If you do it yourself, the program will remind you of important details such as keeping DOS partitions within the 2GB boot code boundary.

The program's wizards walk you though creating a new partition, resizing a partition, redistributing free space, merging partitions, and copying a partition. You can also split a partition into two, specifying which directories you'll move to the new partition.

Power freaks who like to micromanage every behind-the-scenes detail will be happy. PartitionMagic lets you resize the root directory of a FAT partition, change the cluster size of FAT and FAT32 partitions, and convert partitions between FAT, FAT32, and NTFS file systems. In addition, a "secure erase" feature can obliterate all traces of a partition's contents if you're paranoid that men with badges are coming for your secret files. If tweaks cause drive letters to change, the included DriveMapper utility will change references in application shortcuts, INI files, and Registry entries to the new drive letters.

PartitionMagic is normally run from a local, uncompressed drive with Windows 95/98/Me/NT/2000 Professional, or you can run a DOS version of the program from a floppy to repartition a PC that doesn't have Windows installed. This limited version of the program lacks a few features, such as wizards and splitting partitions, but is good enough to get most jobs done.

In our testing, PartitionMagic had a few problems out of the gate. First, it mistook an IDE Zip drive for a hard drive and claimed the partition table was corrupt. After a call to tech support, the capable technician provided a workaround: Disable the Zip drive in the BIOS when running the program. Inelegant, but it worked. The Zip drive could be re-enabled once the hard drive partitions were just the way I wanted them.

For many users, the primary reason to have multiple partitions is to install multiple OSes. To facilitate switching between OSes, the package includes BootMagic, a boot manager. During setup, BootMagic lets you choose which partitions are bootable, name them, and change the order in which they are listed at boot time. The program supports umpteen versions of Windows, Linux, BeOS, OS/2, FreeDOS, and other OSes.

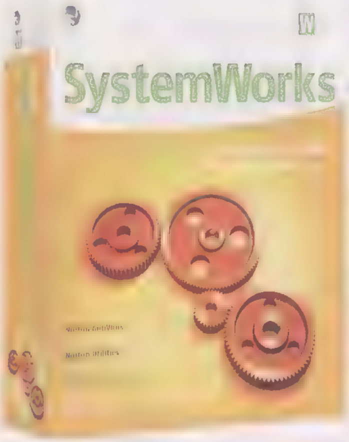
BootMagic's graphical boot screen is prettier than Linux's LILO. You can choose your OS with a keyboard or mouse (USB mice and keyboards aren't supported, however). You can set a startup delay, but if you don't choose an OS from the list within a few seconds, your default OS will boot. Unfortunately, there's no way to automatically boot the last operating system you chose. Further, BootMagic couldn't decipher the boot sector after we installed Windows XP, so we were stuck with XP's text-based boot menu.

You can also set a boot-time password for a modicum of security, but chances are any kid who reads *2600 Magazine* can figure out how to work around it. A Pro version of PartitionMagic is also available that adds a remote agent feature that lets you repartition a PC over a TCP/IP connection.

PartitionMagic handles **FAT, FAT32, NTFS,** and **Linux** partitions. The program supports hard drives of up to 80GB. If fate has burdened you with a larger drive, look elsewhere.

by Kevin Savetz

Norton SystemWorks 2002



Norton SystemWorks 2002
$69.95 ($35.95 upgrade); $99.95 for Professional Edition
Symantec
www.symantec.com

Some PC users are content to leave their computer systems alone. As long as everything on their system is working fine, they are happy. Other users have a compulsion to tweak, optimize, and make sure everything is running at top performance at all times. Norton SystemWorks 2002, a suite of PC diagnostic and repair software, offers a little something for both groups of users.

Some tools in the package are absolutely essential, such as the maintenance and disaster prevention utilities that everyone should have on hand. Other tools are applications that will probably be loved most by those who demand tyrannical rule of their Windows file systems. The overall result is a "kitchen sink" software suite. Ultimately, SystemWorks is useful, but Symantec throws in more gadgetry than even most power users will want.

We will start by looking at the truly essential stuff. Norton AntiVirus is as good as any antivirus program you'll find. It scans your system for existing viruses and monitors e-mail and removable media you insert for new threats. My only gripe is that during a complete system scan, there isn't a progress bar to give you a sense of how long the scan is going to take. The program's LiveUpdate feature does ensure the program's virus definitions are always up-to-date. Updates are free for one year, then available by subscription.

Norton Utilities is a classic, powerful set of tools for hard drive and Windows maintenance. You can use it to give your system a periodic checkup or just keep it around for emergencies. For those emergencies, the UnErase Wizard recovers deleted files. For preventative maintenance, WinDoctor can fix problems plaguing the Windows Registry, and Disk Doctor fixes drive and file problems.

Here's where we creep into the land of obsessive system maintenance. Speed Disk will defragment your hard drive, and the Optimization Wizard purports to optimize the internal structure of the Registry and make efficient use of the swap file size. The Registry management utility tracks changes made to the Windows Registry and INI files, and the Registry Editor lets you take matters into your own hands. The Process Viewer displays details about the programs running on your computer.

The other major parts of the package are Norton CleanSweep and GoBack 3 Personal Edition by Roxio. CleanSweep, the weakest entry in the suite, removes "unneeded" Internet files and uninstalls programs you no longer want. There's really no magic to the Internet cleaner. It simply offers to remove your browser cache, history, cookies, and old plug-ins. The Uninstall Wizard removes applications from your system. Unlike Windows' Add/Remove Programs, CleanSweep can first create a backup that includes your program settings.

GoBack 3, a new addition to SystemWorks, is system recovery software that logs every changed file on your hard drive. If you make a change you later regret, GoBack can revert your system back to a previous state. GoBack provides some peace of mind if you are concerned about your PC crashing or an important file being overwritten. However, there is a price to pay: GoBack slows down operations a bit to log each change and uses about 10% of your hard drive to store its backup data. You will need 200MB of free drive space just to install it.

Getting a grasp of these tools can be overwhelming, but SystemWorks redeems itself with a One-Button Checkup feature, which is an easy way to check for problems and do some system optimization without fussing with a dozen individual tools.

On the other hand, if all those utilities aren't enough for you, SystemWorks Professional Edition might satiate your lust. This version adds WinFax Basic faxing software and Norton Ghost, a utility for creating disk images and cloning hard drives.

SystemWorks works with Windows 98/Me/NT/2000/XP, although not every tool is compatible with every OS. All in all, SystemWorks 2002 is worth the money; it's cheaper than buying Norton Utilities and AntiVirus separately. Use it to keep your system running smoothly, but don't feel you have to use all of its tools to micromanage the workings of your PC. Unless, of course, you enjoy that sort of thing. ▲

> The overall result is a "kitchen sink" software suite. Ultimately, SystemWorks is useful, but Symantec throws in more gadgetry than even most power users will want.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

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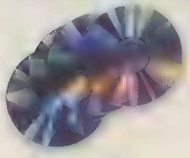
Introducing the Wave/PC™ system.
A revolutionary new product from Bose®.



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The digital camcorder that's a digital camera.

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- MultiMediaCard or SD Memory Card for still images (Elura 20MC only)
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Mini DV

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Canon KNOW HOW™

by Kevin Savetz

Microsoft Plus! for Windows XP

If you're enamored of Windows XP, kick it up a notch with Plus!, a collection of add-ons for Microsoft's newest operating system.

Little of the gadgetry in Plus! is particularly useful, but most of it isn't meant to be. It's meant to "enhance the digital media experience." Plus! does this with games, new themes, screen savers, and additions to Windows Media Player.

The Media Player add-ons are the heart of Plus! They include a module for controlling Media Player with your voice, new skins and 3-D visualizations (the graphics that move with the music), and a CD label printing utility. A speaker enhancement module changes Media Player's equalization based on your type of speakers; settings for about 35 popular PC speakers are included. The Personal DJ creates custom playlists based on your musical preferences.

Games in Plus! include Russian Square, a ho-hum board game; Labyrinth, a snazzy version of the classic tabletop game; and HyperBowl, an adaptation of the arcade bowling game.

Plus! includes four themes, or collections of wallpaper, icons, sounds, and pointers. The themes—Aquarium, Space, Nature, and da Vinci—are nice enough if you enjoy using a gaudy, made-up OS. But only four new themes? That seems a bit stingy.

There's a new screen saver to accompany each theme, plus four others. One, titled My Pictures, is a digital photo album that displays your images in 3-D arrangements. Robot Circus uses texture and lighting effects to display, well, a robotic circus.

To take full advantage of Plus!, you need a video card with 3-D graphics acceleration and 16MB video RAM. Without one, the two best games, screen savers, and Media Player visualizations won't install.

Plus! integrates well into XP with one-click online updates for new features and no pesky rebooting. A pleasant menu interface binds the features together.

Microsoft Plus! for Windows XP
$39.95
Microsoft
www.microsoft.com/windows/plus
CPU CPU CPU

Roxio Easy CD Creator 5 Platinum

Burning stuff is fun. No, we're not advocating arson. We're talking about Easy CD Creator 5 Platinum, powerful software for burning about any kind of CD. The software contains tools ranging from easy and fast to complex and powerful. There's often more than one way to do CD-burning jobs, which provides plenty of flexibility.

If you want to create a music CD, the easy-to-use SoundStream utility can create a mix CD from MP3s, WAVs, audio CDs, or even old albums. Or use Music CD Project to build a professional CD complete with crossfading and composite tracks.

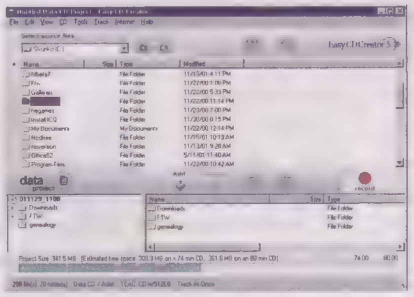
Backing up data couldn't be simpler. The Take Two utility will back up an entire hard drive or selected partitions, advising you ahead of time how many CDs it will need. The CD Copier utility will duplicate a CD or audio disc with one click.

The Data CD Project lets you select which files and folders to burn, combine music and data tracks, and make bootable CDs.

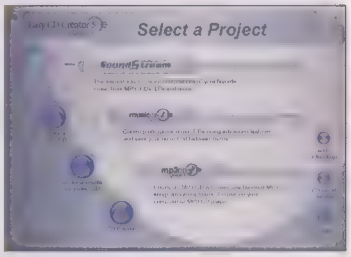
DirectCD uses the Universal Disc Format file system to let you use a CD-R or CD-RW disc like other removable media. You can copy files to the disc from Windows Explorer or save directly to the media with an application's save function. The process can be a bit quirky when sharing this data with other computers.

There are also video and imaging tools. The video tools are the weakest link of the package. PhotoRelay lets you organize your photos into photo albums or slide shows on CD-ROM. Video Impression lets you edit video, but offers little compared with full-featured video-editing software.

Video tools aside, Easy CD Creator is potent software for burning CDs.



Don't be overwhelmed by the number of components in Easy CD Creator; the menu will help you choose the right tool for the job.



Easy CD Creator 5 Platinum
$99.95
Roxio
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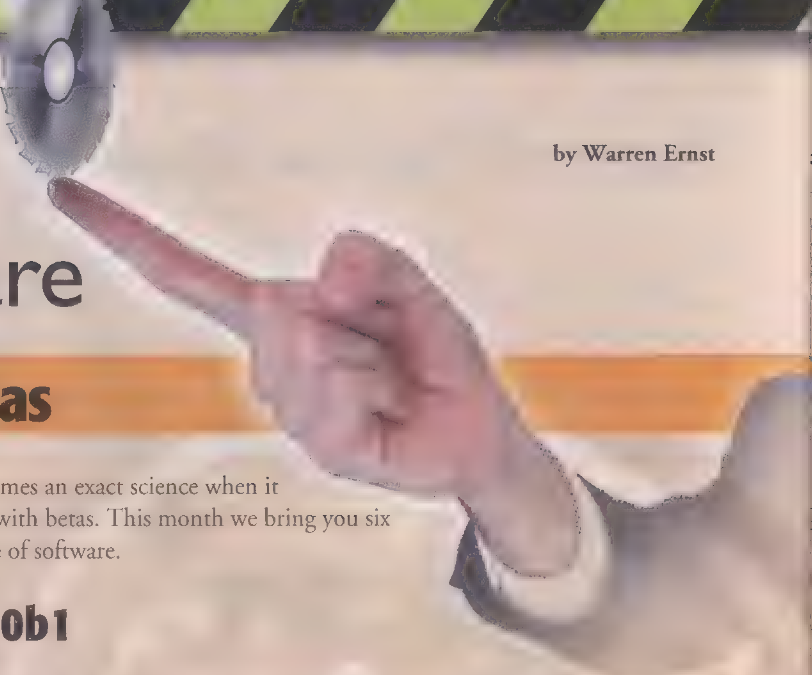
CPU CPU CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect



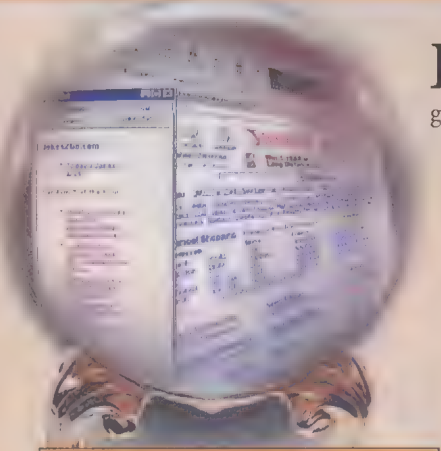
The Bleeding Edge Of Software

by Warren Ernst

Inside The World Of Betas

Fortune-telling becomes an exact science when it comes to working with betas. This month we bring you six glimpses into the future of software.

Opera V6.0b1



Official product name: Opera
Version # previewed: V6.0b1
Publisher: Opera Software
Developer and URL: www.opera.com
Product URL: www.opera.com
ETA: Q4 2001 or Q1 2002
Why should you care: Software giants aren't the only ones who can create an excellent browser.

There's always been a plucky alternative to browser giants Internet Explorer and Netscape Navigator, but the greatly anticipated version 6 of the Opera browser has recently been released and it's a contender.

It almost seems a bunch of talented programmers wrote Opera 6 for themselves and decided to share it because others would like it, too. As a result, Opera 6 has the browser features you expect, plus some you might not have thought of until now, such as tabs within the browser for the different Web pages. Opera 6 is filled with "thinking out of the box" features such as this.

Some of my favorite features include magnifying pages in and out, saving embedded graphics to files, a built-in search engine and find-within-a-page fields in the toolbar, timed page refreshes, built-in pop-up window killers, and the fastest page-drawing engine on the planet.

There's also a full e-mail client app that reminds me of old versions of Eudora. That's not necessarily a bad thing, unless you're addicted to Outlook or Outlook Express. E-mail folders display in a separate window from the message headers and the messages themselves, so dragging and dropping messages for archiving is a snap.

The beta isn't all that stable. I had a lot of application crashes (though not Windows). There are also banner ads in the free version and an almost too-chummy relationship with all Lycos Web pages. But overall, I can't wait for this beta to become final.

SynchroTray 1.00b6

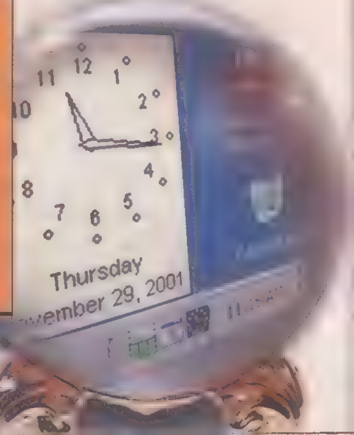
SynchroTray is a little gem of a program that is simple and straightforward and solves a small problem to which most folks don't give a second thought. Often, your computer's clock is slightly off and sometimes wildly inaccurate. This can be due to a weak battery, a cheap real-time click chip on the motherboard, or a login script that copies the date and time from a LAN with an inaccurate clock. SynchroTray is a background program that updates your PC's clock via the Internet using the U.S. Naval Observatory's atomic clock as a source.

Many programs do this, but ST combines the right features (a lot), size (very small), and price (free). ST can automatically check for the right time once a day or when you click the Update Time button. ST adds a small analog clock on the System Tray next to Windows' built-in digital clock. There's also a mouseover tooltip that has an even larger analog clock that displays the date.

The most interesting feature is Time Offset. If you are someone who likes to set your watch ahead 5 minutes so you aren't late, ST can do it for your computer, by as much as 10 minutes ahead or 10 minutes behind.

Though ST is beta software, you wouldn't know it. The program is stable and fast and has a high level of fit and finish and a professional installer and uninstaller. It's well worth the download.

Official product name: SynchroTray
Version # previewed: 1.00b6
Publisher: BrigSoft
Developer and URL: www.brigsoft.com
Product URL: www.brigsoft.com
ETA: Q1 2002
Why should you care: A clock is only as accurate as you set it—so set it correctly and automatically.



WinZip 8.1b2

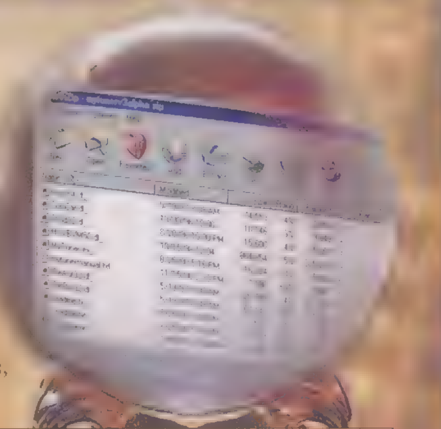
WinZip is software most users already have. As a result, WinZip may be hesitant to change its software too much for fear of alienating users. Fortunately, WinZip can add modern features without changing the front end too much, and the latest beta has some very desirable features.

First, this beta version still doesn't convert compressed files into folders in Windows Explorer like the competition. Instead, WinZip makes users right-click a compressed file and work with the extremely comprehensive pop-up menu or work within the now-familiar WinZip window. This isn't a huge issue, but it isn't nearly as flashy, or in some circumstances, as useful, as ZipMagic.

What remains in the program is solid and innovative in other ways. WinZip now has a built-in file splitter to fit a 10MB file on a few floppies or a few e-mail attachments. The pop-up menu now offers a direct attach-as-e-mail command and a streamlined option to password protect the file. A Taskbar feature optionally awaits your zipping needs at a moment's notice and keeps track of your recently opened Zip files and the locations the contents are decompressed to.

WinZip isn't skinnable in the strictest sense but comes with an optional XP-style toolbar that looks very good in XP but out of place in everything else. Also lacking is support for some alternative compression formats, such as ACE, RAR, ARJ, LZH, and ARC, though you can instruct WinZip to use another program to deal with them. Browsing compressed folders within a Zip file is also a chore.

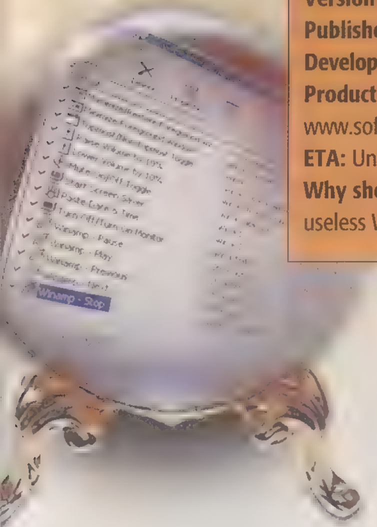
Numerous free compression products do just as much, and sometimes more, than WinZip. Other $30 products practically blow WinZip away feature for feature. For those using WinZip daily, however, the beta adds features you'll probably like.



Official product name: WinZip
Version # previewed: 8.1b2
Publisher: WinZip Computing
Developer and URL: www.winzip.com
Product URL: www.winzip.com/betawz.cgi
ETA: Q1 2002
Why should you care: WinZip is a standard; new features make it more so.

Active Keys V1.0b6

Official product name: Active Keys
Version # previewed: 1.0b6
Publisher: Softarian Development
Developer and URL: www.softarium.com
Product URL: www.softarium.com/activekeys
ETA: Unknown
Why should you care: Gives the useless WINDOWS key a purpose.



Active Keys actually let your keyboard's keys do stuff. Well, stuff besides just displaying letters on your screen, anyway. What we're talking about here are simple macros that start a program, send a specific program (or Windows) a specific command, and more. Some macro programs make you learn a programming language or memorize mouse drags, but not Active Keys.

"Big deal," you say. Well, what if you were able to launch programs with the WINDOWS key, such as pressing WINDOWS-I to launch Internet Explorer, WINDOWS-N to start a Netscape browser, and WINDOWS-O to launch Opera? How about pressing WINDOWS-CTRL-1 through 9 to change the resolution of your monitor? How about being able to mute Winamp's audio system by just pressing WINDOWS-CAPS LOCK? Are you interested yet?

Active Keys recognizes hotkeys no matter what you are doing on your system. The program overwrites the built-in hotkeys in any program, giving you a lot of control and flexibility. A good example of this is the ability to control Winamp—no matter what window you have in the foreground—to Start, Stop, Pause, and Skip through your playlist without having to touch your mouse or having to leave another program.

Active Keys keeps things simple by only supporting the internal commands of a few select programs, such as Winamp, Windows Media Player, Windows Explorer, and your default Web browser and e-mail programs. Available commands, such as Winamp's Pause, are listed in an expandable tree, and you can select new hotkeys by typing the combination you want or selecting them from another menu. New macros are listed in a single window, and you can enable or disable them or specify new icons for them.

The Active Keys beta is extremely stable and probably should be considered as being final because there are still nag screens soliciting the purchase of the app. The price may be a little steep ($20) for some users, but perhaps simplicity is worth the extra cost.

Send Us Your Betas

Know of software in the beta stage that's deserving of some attention? Let us know. We'll take a look at it and possibly give it a go around. Send your prospects to bleedingedge@cpumag.com.

Crystal FTP Pro v2.5b3

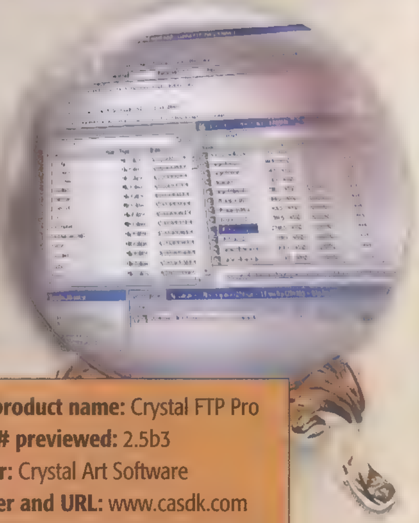
Tired of your old FTP program? "Old" being the operative word here because I remember using WS_FTP in the early '90s. Its primary interface hasn't changed in years. Crystal FTP Pro looks to change this somewhat, plus it offers a lot of interesting ancillary features and the power-FTP tools you need.

Perhaps the best and most promising feature is Crystal FTP's multiple-threading abilities. With them, you can download and upload files and do both while browsing through other folders and files. The catch is you need to be connected to a multithreaded FTP server. Unfortunately, those servers are few and far between. If your own internal FTP server is multithreaded, however, you're set.

Multithreading notwithstanding, CFTP can also retry busy sites automatically and resume interrupted downloads without trashing the files. It also displays bandwidth usage (in and out) in real-time charts and graphs; has a built-in "mini-Tetris" game for those long downloads; supports skins; and has an Explorer-like Favorites list to bookmark FTP sites. The list arrives empty, but there is an import feature for your existing lists.

CFTP can also monitor the Windows clipboard for URLs to FTP sites and automatically take over the downloading responsibilities from IE. This feature does seem to disable nontext clipboard usage when CFTP is running, however.

The beta I used wasn't entirely stable, which is unfortunate because you're still expected to pay ($29.95) for it after 30 days of use. But if the feature set turns you on, check it out and wait for the final revision.



Official product name: Crystal FTP Pro
Version # previewed: 2.5b3
Publisher: Crystal Art Software
Developer and URL: www.casdk.com
Product URL: www.casdk.com/prod/cftp
ETA: Q1 2002
Why should you care: If you deal with multithreaded FTP servers, this will make things much faster.

NewsBin Pro 4.0b14

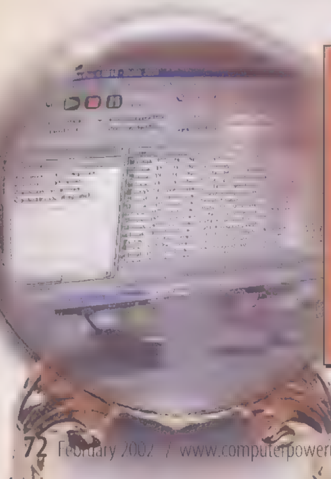
USENET newsgroups can be the best source of files and information on the Internet, but you need to know what to do. Though the newsreaders available from Microsoft and Netscape can download binary files, they aren't really geared for it.

Consider the challenge of downloading a single large file from a newsgroup. Using a regular newsreader, you'd have to locate all the file's parts (sometimes dozens), select them, download the attachments, recombine them into a single file, and decode the large file into the final format you need. This can get tedious, and don't forget some popular binary groups have thousands of new files a day.

NewsBin Pro dramatically simplifies the process. Basically, you tell the program your news server's name, login information, and the newsgroups from which you want to grab files. NBP automatically combines all the file parts and decodes them into the final file formats you want. If the files are GIF or JPG images, NBP also displays thumbnails directly, but you're on your own with compressed files, audio, video, and text.

So far as features go, NBP looks promising. Reviewing posts and files that are processed and yet to be processed is very simple. If you want to manually select binary files, NBP lets you, unlike most of the competition. You can also flag posts and files from certain users with priority flags—handy when you want to continue a download series.

If you're looking for a finished product, NBP version 3 ($35) is your program. Version 4 is definitely a work in progress. There's no help system, and certain commands cause complete crashes. On the other hand, NBP 4 is about the fastest binary news grabber I've used, and that alone makes it worth checking out.



Official product name: NewsBin Pro
Version # previewed: 4.0b14
Publisher: DJI Interprises
Developer and URL: www.newsbin.com
Product URL: www.newsbin.com/nb4/nb4relnotes.htm
ETA: Q2 2002
Why should you care: There's no faster way to grab binaries of the USENET.

Infinite Loop

Kiss My PC

So you're a full-time computer user and you've made the mistake of visiting a health-oriented Web site and discovered your body mass index now hovers firmly in the red zone. Have no fear. When it comes to working out, using your PC may not be the equivalent of jogging, but it does burn up a calorie or two.

To be precise, you burn about 100 calories an hour working away at a computer. That just happens to be the same number of calories you burn for every hour you spend kissing, by the way. Now, it's your choice on how you want to get rid of the calories, but at least mousing and typing won't chap your lips.

by Chris Pirillo

Breaking More Than The Rules

Chris Pirillo oversees the Lockergnome.com e-mail newsletters, hosts "Call for Help" every weekday on TechTV (www.techtv.com), speaks at various engagements across the country, and answers tech questions on his syndicated weekly radio show. He makes fun of ugly programs in his spare time.

Anybody who's worked with the Lotus Notes client has my deepest sympathies; its user interface is unattractive, obtuse, and counterproductive. Is Outlook any better? Maybe, though its nonconformist design is starting to irk me. I can't figure out why Microsoft's programming teams haven't started to center around a standard UI. They're always doing something new. This, in and of itself, wouldn't be a problem, but when they "do something new" with every other program and then package them together, it doesn't look pretty. It's a bunch of Microstuff.

Why are Movie Maker's toolbars different than Internet Explorer's? Can't see the thickness difference? Right-click on either set. Now, see any difference? Call me nitpicky, but I take this as being a sign of poor communication. Also, WinXP's Computer Management tool is still as sore-thumbish as it was in Win2000; even after you resize the window, it returns to its original state the next time the console is launched. Need further proof that everyone's sailing his own boat over there? Launch any Office 2002 product. Why do I need a gray bar on the left side of each menu option? Why do I need icons to "go blue" whenever I hover over one? Yeah, these examples may be petty, but when each program has its own idiosyncrasies, you can imagine how quickly it can dent productivity.

Is it so wrong to want my OS to look nice and all of its apps to stick to the same set of appearance and functional guidelines?

Microsoft's Windows Messenger is a program I cannot and will not recommend to anybody. It's broken, plain and simple. Like many other Microsoft applications, it sets its own interface "standards." Plus, its touted video and audio conferencing features aren't available to those with hardware firewalls that don't support SIP (Session Initiation Protocol, RFC2543). What got me started on this particular tirade? A bug that I was told would be squished "soon." Never listen to marketers, folks. They're nothing more than parrots.

When I turn off the Actions pane in the latest Windows Messenger, I expect it to stay off. I'm using 4.5.0127 on Windows XP Professional, and no matter how many times I tell it that I don't want to see it, the Actions pane keeps coming back. Kinda. Try it on your computer. Open the program, turn off the Actions pane, and close the window (sending it to the System Tray). Double-click its icon and what do you see. Ah! Yes, the very thing you told it you didn't want to see. GO AWAY!

Now, close the application entirely (right-click its System Tray icon and select Exit). Relaunch it and . . . the Actions pane isn't there. Now close the window again (sending it to the System Tray). Double-click its icon and what do you see? Ah! Yes, the very thing you told it you didn't want to see. Hello? Is anybody home? And don't even get me started on the Messenger's gargantuan emoticons. At least you can turn those off. My point? You're not innovating if you're breaking something other than the rules.

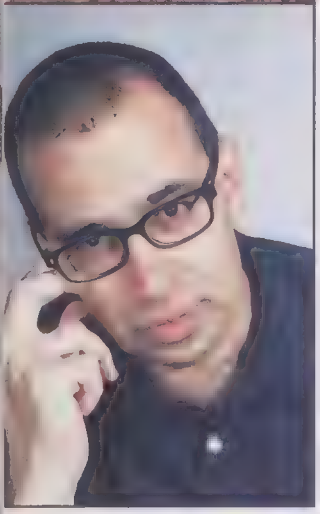
I keep hearing how Luna (WinXP's default skin) was an improvement. Really? Why? Because the title bar and its icons are visibly larger? Because it wastes precious screen real estate? That doesn't make sense. They should have incorporated something useful into it, like roll-up functionality. Something we actually would have USED. It's a USER interface, right? I'm not saying the Redmond gang should run out and slap bells and whistles on all of its products, but the least it could do is get them to look the same, since "work the same" was a feature set we gave up on long ago.

Put down that crystal ball; the Windows of tomorrow are easily accessible today. Check out MSN Explorer, a free download from explorer.msn.com. While it isn't the most powerful software I've used, it's clean, slick, and relatively smart. In a word: intuitive. As the PC evolves to handle a wider variety of tasks, we'll continually search for the easiest way to manage our "stuff." Is it so wrong to want my OS to look nice and all of its apps to stick to the same set of appearance and functional guidelines? I'm in my right (click) mind. ■

You can dialogue with Chris at chris@cpumag.com.

by Pete Loshin

Half A Dozen Cool Linux Tricks



Pete Loshin, former technical editor of software reviews for BYTE Magazine (print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.

This month's column was going to be called "Cool Things You Can Do With Linux (But Can't With Windows)," until I remembered it has been more than a year since I've used Windows (98). So I decided to stick with what I know.

Though I'm not the ultimate Linux guru, I've discovered some cool Linux tricks this year. Most come from Linux books, Web sites, magazines, and newsgroups, and most apply to any UNIX-like OS (or ULO—a new coinage, as far as I know), including the various flavors of BSD and any commercial UNIX.

ULO techniques and tools from 10 years ago still work today, and likely will work 10 years hence. ULO users draw on decades of experience, so if you can't build your own solution, you can always use someone else's.

Enjoy!

Pipes & Filters

Pipelines, or pipes (invoked with the | operator), transform output from one program into input for another. With pipes and the right programs, you can do anything.

Start with **ls**, the directory-listing program. Options for ls let you choose what file information is listed and the order files are listed.

The command **ls -las** outputs detailed listings, but it can overflow the terminal screen. So I pipe the output of ls into less, a powerful command line tool for paging through files. The command appears as:

```
ls -las | less
```

To send the output to a file, try:

```
ls -las > dir_file_name.txt
```

Or, I can send ls output to another program, **wc** (word count), to count files in the directory using:

```
ls -A | wc –w
```

Or, to list the 10 most-recently modified files in the directory, pipe ls to the head program:

```
ls -last | head
```

Handy when you're trying to find some file you worked late on and now you can't remember its name.

Regular Expressions

Wildcards are handy, but regular expressions are awesome. If you can define a pattern, you can build a regular expression describing that pattern—and then find any or all instances of that pattern, and do what you want with them.

The seminal regexp tool, **grep**, (from "get regular expression") finds strings within files that match your expression. Let's say I need to review all mail messages containing the word "monkey" and its variants ("monkies," "monkee," "Monkees," etc.). Grep makes this easy:

```
grep -ilr '\<monk[ei][ey]s\?\>' ~/Mail/*
```

The -i option makes the search case insensitive; -r greps recursively through subdirectories; the -l option lists only the names of files containing pattern-matching text. The expression '\<monk[ei][ey]s\?\>' means all instances of word (but not things like "monkeying" that don't end in "y" or "s") starting with "monk," whose fifth letter is "e" or "i," whose sixth letter is "e" or "y," ending with an optional "s."

This imperfect expression matches other strings, including "monkIYS," "MONkey," and "mOnkeeS." If it isn't good enough, it shouldn't be too hard to go back and fine-tune it.

This is powerful and complicated stuff. It's also central to mastering Linux. One good source is "Mastering Regular Expressions" by Jeffrey E. F. Friedl (O'Reilly & Associates; 1997). In it, Friedl offers a sample:

grep -i `'\<([a-z]+) +\1\>'`, which finds all instances of doubled words ("the the") in a file.

Once you find the errors, you can fix them by hand (tedious) or with pipes. I don't quite know how to do this, yet, but you can take grep output and pass through **sed** (Stream EDitor). Sed takes a stream of characters as input, modifies it, and outputs it. For example, this command:

sed 's/the the/the/g' file.txt > newfile.txt, reads in file.txt, changes "the the" to "the", and writes the output to newfile.txt.

Mail

With dozens of clients to choose from, Linux users can choose from high-end graphical mail readers, such as Evolution (similar to Microsoft Outlook), to the very low-end mail command.

I chose **exmh**, a graphical reader for the geeky mh (mail handler) mail format. Mh stores messages as files organized in folders and subfolders and displays messages in order by their numerical filenames; sorting messages means changing filenames. Mh manages messages with basic ULO tools, and you can read mail with any mh-aware tool: exmh, a text editor, or the command line.

My favorite mail trick involves searching for messages with grep. To find all messages mentioning Peter Tork or The Monkees, use the command:

grep -irl 'Peter Tork \| Monkees' ~/Mail/*, which lists all messages containing either "Peter Tork" or "The Monkees."

Partitions

You wouldn't access a physical hard drive directly, but rather mount it onto your file system under Linux. Partitioning those drives allows you to divide them into different logical units that can be managed individually.

For example, you can create one partition for your out-of-the-box installation (usually /usr) and another for custom installations (usually /usr/local).

Using this partitioning trick, you make upgrades and reinstalls painless. When you're ready to upgrade to Red Hat 8.0, just clear /usr and install the new distribution. All locally installed programs and all configuration, log, and user files stay put. Reboot, and everything should still work. If it doesn't, just clear /usr again and reinstall the older distribution.

Build Your Own Tools

If you use the command line, you can build a simple shell script and set it up so you can access the script through an icon on your GUI Desktop. For example, the script

```
#!/bin/sh
mount /mnt/NFS/backup
cp -a ~/ /backup/
mount/mnt/NFS/backup
```

connects to a shared file system with NFS, copies my files to the server, and disconnects. It's a good example of a bad script (no checking to make sure the server isn't already mounted and no way to handle errors, for starters). But once I make it an executable, it's a script. Here's the command:

```
chmod +x mybackup
```

I can even turn this into a GUI app on my GUI Desktop (there should be a tool that lets you add apps within the GUI).

> **Are Windows users shut out from the fun? Not entirely. There are Windows versions of grep and sed, as well as any number of other cool ULO tools like perl, awk, emacs, vi, and many more. They're just better on Linux.**

Shell Games

When you're working on the command line, you can scroll through your prior commands with the arrow keys. Not only can you scroll, you can search through your history file to find that brilliant regexp you wrote last week. Hit CTRL-R at the command line (the prompt changes to (reverse-i-search)``:) and enter a string to search for. For more matches, keep hitting CTRL-R.

Bash shell users can view or even edit their command history in a file called .bash_history located in your home directory.

These are just six (or so) tricks for newbies that I've picked up lately. There are probably millions more, and much more impressive ones, too. Sure, I spend a lot of time on this stuff, but it's worth it for the effortless, half-hour, OS upgrades.

Are Windows users shut out from the fun? Not entirely. There are Windows versions of grep and sed, as well as any number of other cool ULO tools like perl, awk, emacs, vi, and many more. They're just better on Linux.

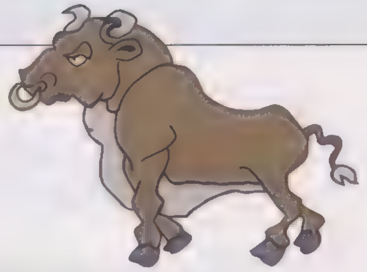
Tidbit: Good Sources

A search on "linux" at Amazon.com returns more than 600 books; most of those won't be right for you.

I've found a handful of resources that really work, for me. They're not the only ones I like, but they're the ones I keep on my desk. I'll keep you posted as I find more:

- "The Linux Cookbook" by Michael Stutz (No Starch Press; 2001); excellent if you need help with one of the many Linux tasks covered.
- "UNIX Power Tools" by Jerry Peek et al (O'Reilly & Associates; 1997); a dandy source for quick fixes and powerful tricks, but not for newbies.
- "Red Hat Linux Administrator's Guide" by Kerry Cox (Prima Tech; 2000); explains not only how to do it, but how and why. A must read for aspiring Linux power users. ■

Get saucy wtih Pete at opensauce@cpumag.com



Words From The Web

Yeah, they *actually* said this . . .

"Sure, I rode that bull, because I gave that kid my word."
From an ESPN chat with "College GameDay" football analyst Lee Corso, on fulfilling his promise to a fan to ride a mechanical bull in Lincoln, Neb., if the Nebraska Cornhuskers defeated the Oklahoma Sooners.

"Hoser isn't a word as I discovered yesterday"
From a Yahoo! parenting chat room, proving that parents still have much to learn.

"At what point should you have started watching wrestling to be considered a REAL fan?"
From an Excite wrestling chat room. The answer is Aug. 12, 1981.

"Because I like to people as dumb as you look stupid"
*From an AOL *NSYNC chat room. (We don't know what it means, either.)*

Clearing The Air & The Web

You may not have heard of Clear Channel, but you've probably listened to one of its radio stations. Clear Channel has been buying radio stations faster than Martha Stewart can fold a napkin and now owns more than 1,100 of them. That's probably why you've been hearing more Jennifer Lopez and less Jethro Tull on the airwaves lately.

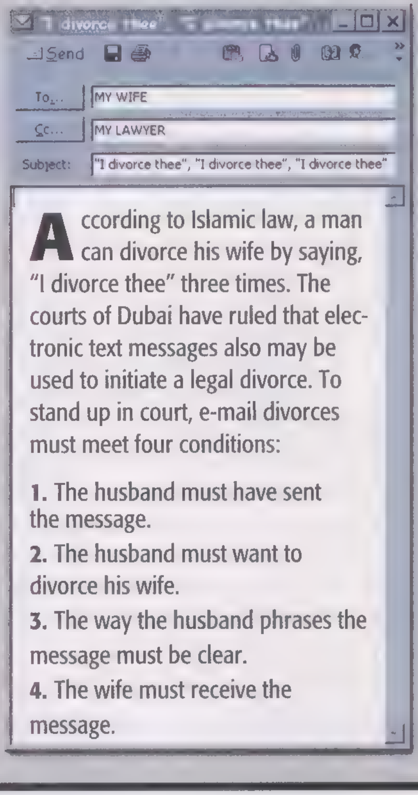
On Nov. 12, 2001, Clear Channel announced the company will start offering online music subscriptions for local radio stations in five cities: Los Angeles, Chicago, Houston, Phoenix, and Salt Lake City. Users can go to the radio station's site and listen to their favorite genre of music, including country, rock, or jazz. At press time, the service was scheduled to kick off in January 2002.

A company called FullAudio will provide the technology behind this endeavor. The corporation says it's developed a "cache-download" technique that delivers higher-quality audio over the Internet than streaming audio, which I think is a godsend because streaming audio over the Internet typically sucks. You'll also be able to listen to your tunes even after you've disconnected from the Internet, which is good because it's *so* difficult to flip on a radio anymore.

The catch is this: Clear Channel is offering this service as a paid subscription, which makes perfect sense because finding free music on the Internet is practically impossible, as we all know. Ahem, anyway, subscribers will pay between $5 and $15 per month for a set number of tracks the user can download and play an unlimited number of times. Subscribers will have several levels of service from which to choose. It'll be interesting to see how Clear Channel's music service will compare to Napster's, which should be available early in 2002. ▲

Infinite Loop

Breaking Up Is Easy To Do



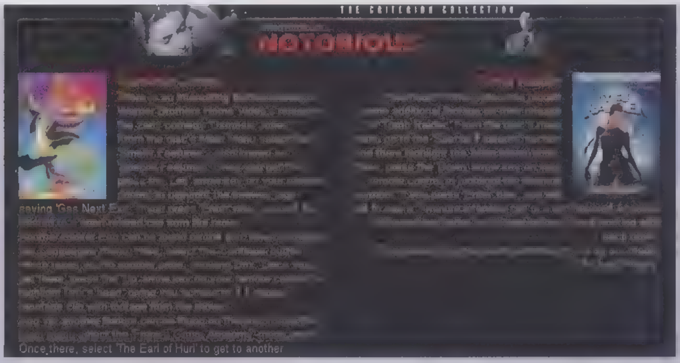
To: MY WIFE
Cc: MY LAWYER
Subject: "I divorce thee", "I divorce thee", "I divorce thee"

According to Islamic law, a man can divorce his wife by saying, "I divorce thee" three times. The courts of Dubai have ruled that electronic text messages also may be used to initiate a legal divorce. To stand up in court, e-mail divorces must meet four conditions:

1. The husband must have sent the message.
2. The husband must want to divorce his wife.
3. The way the husband phrases the message must be clear.
4. The wife must receive the message.

by Michael Sweet

Happy Hunting



Angelina Jolie is hiding more than just her talent in the "Tomb Raider" DVD.

You've heard of Easter Eggs, those little nuggets of goofiness that software programmers slip into applications when they've been staying up too late drinking Jolt and eating microwaved burritos. DVD movies have them, too, and you can find a list of DVD Easter Eggs at the DVD Review Web site (www.dvdreview.com). Click the Hidden Features link to see the list of DVD movies in which Easter Eggs have been found. Each listing has a description of the movie's hidden features and how to access them.

The list of movies is, well, eclectic. It includes popular hits such as "Fight Club," "Alien 3," "Shrek," and "Raising Arizona," as well as titles you may have missed at the box office, such as "Weird Al Yankovic: Live!," "High-lander 4: Endgame," and "Space Truckers." The list continues to grow as visitors to the site send in new discoveries.

The Easter Eggs range from interviews to deleted scenes to additional credits. I read some of the listings and found that the "Tomb Raider" disc has a hidden interview with Angelina Jolie and daddy Jon Voight. The "Austin Powers: The Spy Who Shagged Me" disc includes a Dr. Evil comedy sketch from Comedy Central. Apparently the disc for "You've Got Mail" has many hidden features, but if you're watching that, you have more worries than finding Easter Eggs, such as how to talk your better half into watching "Starship Troopers" instead. ▲

Once Upon A Web Site . . .

Web sites and Web pages are kind of like socks. Sometimes they just disappear. But unlike your socks, you can find lost Web sites and Web pages at the Internet Archive Wayback Machine (www.archive.org). The Internet Archive has more than 10 billion Web pages in its library, gathered from 1996 to the present. That's more than 100TB (yes, terabytes) of information. One terabyte equals 1,000GB.

The site has various special collections of past Web pages, so you can see what Yahoo! or Amazon looked like in 1996, for example. If you have a URL for a lost Web site, you can enter it in a search box. Miss the Pets.com sock puppet? Type **pets.com** in the search box, and you'll find the old dog, provided you check out the pages before Nov. 9, 2000 when Pets.com officially closed. You can also look up older versions of current Web sites, such as eBay or The Well.

The search results are listed by date in six columns, one for each year from 1996 to 2001. Click one of the dates in the list, and you'll see how the Web site looked on that date. I looked up 1997 versions of Yahoo! and ESPN.com. ESPN.com looks much better than it used to. Yahoo! looks nearly the same. How about a face-lift, guys?

The major drawback of the Internet Archive Wayback Machine is that the service won't work all of the time. The site has a "Service Intermittent" warning prominently displayed on the site's home page, and they're not kidding. The Wayback Machine is apparently way short on servers and can't handle the current traffic load. The site organizers are working on adding more servers. Still, this is an interesting archive of the way things were. ▲

Loch At This

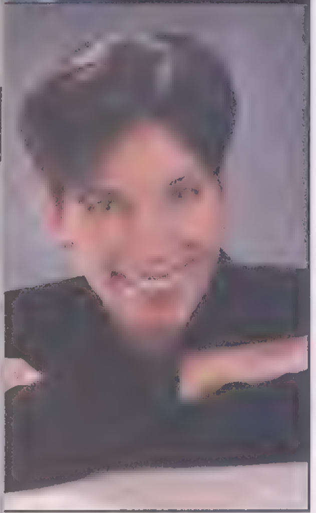
Spend a day at the loch without leaving your desk.

One of the easiest ways to waste time online is to go to a Web cam site. You can stare blankly at darkened street corners, refrigerators, or CPU Publication Editor Samit Choudhuri as he eats Cheetos on his couch. OK, that last Web cam doesn't exist any more than the Loch Ness Monster does, but you can try to catch a glimpse of Nessie at the Visit Loch Ness Web site (www.visitlochness.org).

The site has a live Land Cam and Boat Cam scanning the waters of the mysterious loch 24/7. The Land Cam is refreshed every five seconds and is located near the famous Urquhart Castle. The Boat Cam is affixed to the bow of the M. V. Deepscan, a research ship that regularly prowls the waters of Loch Ness. Each Web cam has archived images so you can see previous pictures of the lake sans monster when you get bored with the current one. ▲

If you find a strange, interesting, or funny Web site in the course of your Internet travels that you think is worthy of Fringe, send your suggestion to fringe@cpumag.com by Lisa Lopuck

Enhance Site Usability



Lisa Lopuck is an award-winning designer, an international speaker, and a best-selling author. She has been on Macromedia's Fireworks advisory board since the product's inception and has consulted for numerous Internet companies in the Bay Area. In 1998, Lisa founded eHandsOn.com, an e-learning content management company. In 1996, Lisa co-founded and served as Creative Director of Electravision, an award-winning Web design studio.

What do eBay, Yahoo!, and Amazon.com have in common? Aside from being some of the most popular sites on the Internet, they also share three simple usability tactics that we can all learn from. All three sites feature:

- Centered pages
- Ample use of redundant text links
- A simple search function

Centered Pages?

Centering your pages is one of the simplest things you can do (and why I mention it first) to enhance the usability of your Web site. It didn't occur to me until recently why centering your page content could boost usability, but let's just think about what centering can do.

When you buy a monitor these days, you are generally buying one with a large display. The Apple Cinema displays, for example, have set off a trend of wide-format screens. When you visit a Web site, such as Macys.com, what you get are pages with left-justified, fixed-width tables. When viewed through a large monitor, a Macys.com page looks like a postage stamp stuck way up in the left corner, affixed to a big white background. Such a condition doesn't adversely affect the site's usability, but it does take away from the site's visual impression—which affects things like site credibility.

> **When viewed through a large monitor, a Macys.com page looks like a postage stamp stuck way up in the left corner, affixed to a big white background.**

By simply adding <center> tags to the page, you make the user experience more consistent across different monitor scenarios (from laptops to Apple Cinema displays) without requiring massive redesign efforts.

Good Old-Fashioned Text Links

Interestingly enough, user tests have repeatedly shown that people will completely miss a big graphic button saying "Buy now and Save 10%," but will click on a simple blue underlined text link that says the same thing (www.useit.com).

We found this phenomenon to be true at eHandsOn.com (RIP). At one time, we had a big button advertising a free Flash course. People who knew about the offer would come to our site, not find the big button smack-dab on the home page, and call customer support. Weird!

In an era of banner-ad overload and junk HTML e-mail, it's not surprising that users trust good old-fashioned text links embedded in a page as a link to worthwhile content. The lesson here is that you should add redundant text links for anything that's important. For example, if you own a shopping site, you should add an extra "Checkout" text link wherever you are currently using a graphic "Checkout" button.

Simple Search Functions

People love search functions on a Web site because they allow them to quickly get to what they need—allowing them to circumvent your navigation system. Search functions give users direct and immediate control of where they go.

A search function, therefore, is so important that it's imperative to have it in the same spot on each page of your Web site. In addition, you must provide a search field, not a link to a separate search page with advanced features that will just slow down and confuse people. A simple three-fold formula works best: The word "Search," a text box, and a GO button.

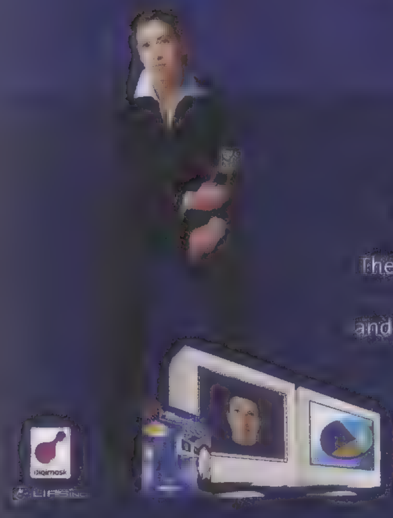
If your site is so diverse that you need a "scoped search" (one that targets the search to specific regions of your site like "books"), make sure the search formula reads like a sentence: Search + pull-down menu with scope choices like "books" + text field + GO button. If using a scoped search, however, make sure the default scope is set to "All" just in case users neglect to choose a parameter.

It's A Wrap

Now that we are past the holiday fury, perhaps your team has time to evaluate your site's performance. Whether you manage an e-commerce or corporate Web site, these three simple usability tactics are things that your Web team can easily implement for the year 2002. ■

As always, I welcome your ideas and feedback at lopuck@cpumag.com.

Communicate in 3D



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by Rob "CmdrTaco" Malda

playfair.txt

Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler then he actually is.

The Net is a cruel place, and it seems to be getting even crueler. I'm not talking about punching puppies here, but I remember a time when it was possible to surf the Net in the only real Web browser available, that glorious beast known as Mosaic. The Web caught on because it was simple and standardized, and you could click View Source in your browser and immediately see the plumbing for whatever site you were looking at. Life was good.

But you can't stay in Eden forever. Terrifying new non-standard additions began cropping up. The CENTER tag? The BGCOLOR tag? Suddenly Web pages began to look a little nicer, provided you ran Netscape. And it didn't stop there. TABLE and FRAMEs made sure certain browsers were required, but the trusty View Source command made it possible for the aspiring Web master to steal what he pleased from other Web sites.

Despite what some think, I'm not really a conspiracy theorist.

But Java started to change that. Suddenly you couldn't see the source. Many Web sites started alienating users with browsers that didn't support the changes. And unlike the CENTER tag, your browser wasn't likely to have a good way to fall back to something primitive like (gasp) left aligned text. No, now you started getting warnings. "This site requires Java." How dare I not want to run untrusted code on my box!

Evolution did its dance: Macromedia brought forth its cursed Shockwave. RealAudio arrived with its big brother RealVideo. And who can forget when *The* big brother started breaking Java while pushing ActiveX. Each of these things served to fracture the blessed compatibility that made the Web World Wide. With each browser release, the Web became more tangled.

Don't get me wrong! I dig glitzy multimedia Web pages. I love when an embedded video shows me naked women telling me what the AP wire told them to say. I love playing the silly little Flash or Java video games. And while I've never really had a browser capable of using an ActiveX plug-in, I'm told that some of them are very nice, provided your concept of system security includes making sure that your system's root password is the same as its reverse lookup.

I can also accept that many of these plug-ins won't run on my operating system of choice, but things go south when the site decides to misread my User-Agent tag.

The User-Agent tag is a confusing little string that your browser probably sends with every page you request. There are sort of standards, but it's very informal, and frankly, it doesn't really matter. Some Web masters have decided to helpfully alert visitors that their browser is incapable of displaying pages. Never mind that in many cases, their guess is wrong: Just because I'm not running Netscape or IE doesn't mean that I can't display certain plug-ins. And it definitely doesn't mean that no page should be served at all!

Sound crazy? Fox did it. So did MSN and numerous others. Some have plausible deniability. Some have monopolies to expand. Despite what some think, I'm not really a conspiracy theorist. I really think in most cases it is just a lack of proper testing.

Don't misunderstand; I'm guilty too. My Web sites violate RFCs like the end of the world is coming and only syntactical errors will save us from total annihilation. But I don't turn away users because their User-Agent says they are running a browser I don't recognize. These days there are countless browsers, and many of them are surprisingly compatible. Heck, I've seen Konqueror running ActiveX plug-ins on Linux. Should the Web browser have to lie about what it is just to get a server to cough up a page? I've had to do it countless times.

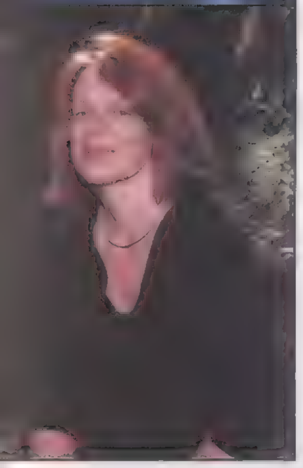
Think about it next time. They say you can't judge a book by its cover. (Although if a book has fighter jets and monsters on the cover, it's going to be a lot cooler than if it just has letters on it.) When it comes to the User-Agent tag, use it for generating statistics. Don't use it to reject a visitor! Play fair! Give them the damn page! If it doesn't render, they can try a different browser.

Here's some homework for curious users: Change your user agent. Or try running a really old browser. Watch how fast things are when that extra glitz melts away. ■

Flame me at malda@cpumag.com.

by Joan Wood

Surfing Widescreen



Starting as gopher for the Emmy-winning team that pioneered live in-car TV cameras for the Indy 500, Joan became an independent video/sound engineer, technical director, and producer. Playing with Reality Engines and motion platforms led to co-founding Xatrix Entertainment where she produced the two Cyberia games. Before 3-D acceleration was trendy, she formed Mango Grits to develop hardware-only game Barrage for Activision. Since cashing out from SharkyExtreme.Com, where she was co-founder and managing editor, Joan has retired.

I've spent my entire adult life staring at monitors. Images from video cameras, tape machines, satellite feeds, motion capture systems, supercomputers, and now the Web have come streaming into my brain through these power/space/money hogging tubes, and I can't seem to get enough. Two at a time, four, six; I topped out at nine in my remote TV production truck. There is even a three-screen version of Barrage floating around somewhere. So when it comes to screen space, I say that size does matter, and two is more than twice as good as one. Especially when browsing.

Since Mosaic begot Netscape, darn few innovations have really changed the way I surf, but multi-monitor support not only improved browsing, it affected the way I do almost everything on my PC. While Apple has had multi-monitor support since Jobs was in short pants, not many were using it outside the graphics-creation community. The last few years have seen NVIDIA include TwinView multi-monitor support on some products (Quadro workstation, GeForce2 MX and GeForce2Go), and ATI acquired Appian Graphics' quite nifty HydraVision multi-monitor software for a few boards (RADEON VE and MOBILITY RADEON), but these guys are pretty busy duking it out over Quake III scores, and neither has pursued multi-monitor innovation with quite the same focus as Matrox.

> Size does matter, and two is more than twice as good as one.

Implemented in 1999 to allow a single PC graphics card to power two displays, Matrox initially thought that the Millennium G400's DualHead multi-monitor feature might be a nice little niche market for day traders and the like. When asked back then, Matrox really hadn't given much thought to what Web masters and game designers would do with the extra screen space. Though I had used multi-monitor setups with SGIs, I became completely addicted to dual monitor for layouts and editing, and eDualHead particularly for fact checking at Sharky Extreme, which brings us to my current rig.

What's a girl to do with TWO Sony 18.1" LCD flat-panel displays? Now that's not a question that gets posed every day, especially when accompanied by a flashy Pentium 4 2GHz hunk with a spanking new Matrox Millennium G550 Dual-DVI board wagging its dual-digital cable and saying "I do"! Sure, I could have had a GeForce3 Ti 500, but I'd have to give up half my screen space, which brings us to eDualHead.

Dual display surfing provides for some unique opportunities, and Matrox exploits a few of them nicely. **PageJump** opens two browser windows. When you press the CTRL key and click a hyperlink, the new page appears in the second window. I use this one a lot with search engines and news wire services. Also good for sites sporting front pages dense with links, PageJump keeps one screen with the original "listing" page and the other with each selected "jump." Retire your back button.

PageWrap opens a variable number of browser windows, you set the variable. When you go to a very long Web page, it displays the top of the page in the first window and "wraps" (with selectable overlap) the rest of the page into the others. This is handy for reading long articles on those sites that put the whole piece on one page, but I'd use it more if I could combine it with PageJump for those sites with really long front pages AND very dense links. Retire your scroll bar.

PageLog is just about what you'd think it to be. When you have it open and are browsing, it keeps a log of all the sites you visit and each page you click, as well. Unlike your browser's "History" links, you can drag and drop to re-arrange the list, delete whole branches, and save individual sessions. Great for researching a particular subject, it keeps all your juicy links coherent. Retire your History button. That brings us back to surfing widescreen.

I'm retired. I don't stay up all night editing and fact checking anymore. I no longer NEED to have Word, Photoshop, Excel, EmEditor, Outlook, CuteFTP, and 16 messaging windows open simultaneously. But I still browse, and that is quite enough to fill as many monitors as can be crammed on my puny desk. ■

Got monitor envy or think DualHead is two more than I have? E-mail joan@cpumag.com

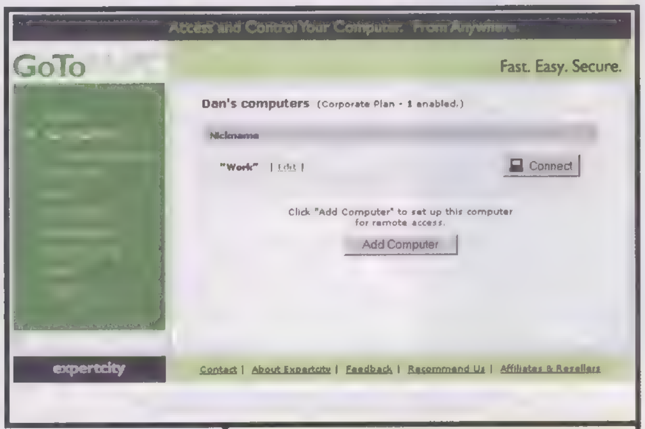
Inside GoToMyPC

Make Any Computer The Computer You Need

How many times have you been out running errands or sitting on the train wishing you were at your desk working on your own computer? Isn't it frustrating when you remember to update a document only after you're already on the way home? Couldn't you just bang your head against the wall when you suddenly realize, while working from home late at night, that you need a phone number or invoice code that's in the company's firewalled databases to finish a project?

There are many reasons why virtual access to your home or office PC from anywhere would be convenient. Although the technology to make this access possible has existed for nearly a decade and there are several products on the market that replicate the experience of sitting at your home or office computer, few are as easy to use, as easy to install, or as affordable as GoToMyPC.

To use this service, users register for an account at the GoToMyPC Web site (www.gotomypc.com) and then download the 1.4MB program to the computer or computers they want to remotely access. After loading the software, which automatically configures the PC as the host computer, a user can log on to the GoToMyPC site from any computer anywhere, press a single button on the site to connect, and see the full screen of her host PC Desktop in front of her, as if she were sitting directly in her home or office chair. Users pay monthly or yearly for this service, and payment is as low as $10 per month for individual users


Access and Control Your Computer. From Anywhere.
GoTo
Fast. Easy. Secure.
Nickname
"Work"
| Edit |
Connect
Add Computer
expertcity
Contact | About Expertcity | Feedback | Recommend Us | Affiliates & Resellers

Dan's computers (Corporate Plan - 1 enabled.)

Click "Add Computer" to set up this computer for remote access.

Your Desktop appears exactly as if you were sitting in front of the host PC.

GoToMyPC Is Going, But It Has A Way To Go

Though GoToMyPC is simple to set up and use, and its capacity to create an exact duplicate of the host PC is incredible, GoToMyPC's reliability is somewhat shaky, and its sometimes sluggish speeds will likely leave the user yawning. The program's ease of use and attractive pricing make it a good choice for occasional or emergency PC access, but it's too frustrating of an experience to be a substitute for a VPN (Virtual Private Network) or a more robust telecommuting solution.

Get going. Getting started is a cinch; it's one of the best things about using GoToMyPC. Go to www.gotomypc.com and register for an account. (We heard conflicting reports from company customer service representatives about what type of browser you'll need. One person told us, as the Web site says, you can use Navigator or IE 4.0 or higher, but another person told us that Navigator wouldn't work.) After receiving confirmation by e-mail, follow the e-mail link back to the GoToMyPC Web site. Users choose from a personal plan, where one user can use up to two machines; a premium plan, where a single user can juggle between multiple machines; or a corporate plan, which allows multiple users access to multiple machines, as well as some system administration abilities. Prices for these services range from $9.95 per month for a single user of one host PC to $22.95 per PC on a corporate plan.

Minimum requirements. While you can download the GoToMyPC software to a computer with a dial-up modem, Expertcity recommends that the host computer have an always-on connection, which makes sense. If you're trying to access your host computer from somewhere else, you won't be there to dial the computer into the Internet. As the product name indicates, the host PC must be a Windows-based PC; GoToMyPC will work on Win95/98/NT/2000/Me/XP. Install the software, and your host machine is ready to go.

Then, head for your remote access computer, which can run Macintosh, Linux, or Solaris; an Internet-enabled handheld that runs Windows CE; or any other Windows box or operating system that supports Java. GoToMyPC recommends that the remote access computer have an always-on connection, as well. Simply log in from the GoToMyPC Web site, and that remote computer will be automatically configured through the browser.

Once signed on, the Web site will list the names of all the host computers you've put on the network and present the user with a single Connect button for instant access. Users will have to enter a second password/authorization with one computer on the GoToMyPC network. (See the "GoToMyPC Is Going, But It Has A Way To Go" sidebar for more specifics about GoToMyPC.)

Expertcity

The GoToMyPC technology was developed in 1999 by University of California, Santa Barbara Computer Science professor Klaus Schauser as a way to access his PC globally and as a tool that would let his students have access to information on the same computer. Now, Schauser is CTO of Expertcity, the company who markets the virtual remote technology in a series of products, including ExpertLive, a remote technical support program released in 1999, and Desktop-Streaming, a licensed corporate solution that offers remote customer care.

GoToMyPC is the company's most recent offering (first released in June 2001) and its first product offered to businesses and individual consumers alike. Expertcity is located in Santa Barbara and employs a staff of about 100 to keep the network up and running. The company is privately held, but investors include Sun Microsystems, ZDNet, and Bertelsmann Ventures.

At press time, Expertcity CEO Andreas von Blottnitz said that GoToMyPC had 20,000 users, but he expects that number to double in three months. He says GoToMyPC's potential audience is anyone with more than one computer and an Internet connection but specifically notes that most users will have one computer at home and one at work and the need to access data between the two. He estimates that

Improvements In Version 2.0

At the end of 2001, Expertcity released the upgrade to GoToMyPC based on customer feedback and product review. That's good news for the user, who gets a more robust, secure, and flexible product as a result.

Your platform or mine? One of the more vast recent improvements was the adoption of other platforms, such as Windows CE, Solaris, Linux, and of course, Macintosh. Updating the product architecture with the Java-based Universal Viewer opens up the product to many more users.

Security smackdown. Other improvements give the remote user more privacy and more control of the host PC. Now users can choose to have the remote monitor go black so prying eyes at the home or office can't see what you're working on from afar. In addition, users can lock the mouse and keyboard of the host PC so no one can input data while they work.

Sharper back-end administration. For corporate users, system administrators will have more control of the company-wide network. Admins will be able to organize users into groups, such as by department or access level, and more closely monitor access privileges to specific files or folders. Improved Secure ID integration will help prevent security breeches and attacks. ▲

code for ensured security. Then the data between the host and remote computers is highly compressed and sent between them across the GoToMyPC network of Java servlet Web-serving engines, application servers, and databases. The host machine appears exactly as it would if you were in front of it, with icons, Desktop patterns, and exact folder structures intact. That's it. The entire process succeeds at being as simple to establish as e-mail.

The catch. At least, in theory, that's it. What we learned through trial, error, and half a dozen phone calls to tech support is that version 2.0, the current incarnation of GoToMyPC, can be very finicky. Some nitpicky annoyances, such as the ability to use Mac OS 8.6 or 9 only and the need to download MRJ (Macintosh Runtime for Java) version 2.2.5, might force a new user to spend a lot of time updating configurations before getting started. And what a hog! For a stable connection, users will need to increase IE5 memory size to 8,000KB, more than 3,000KB over the program's preferred size. And while GoToMyPC is running, other functions or open programs on the remote computer slow considerably.

If you decided not to heed Expertcity's recommendations and use a dial-up modem on your host PC anyway, you'll find the going slow. It takes nearly a full minute for the connection to load from a 56Kbps modem-powered PC to a DSL-speed Mac. We were unable to cut and paste data between the two machines or move files from one to the other. And there's about a 30-second lag time between every click made on the remote PC and the result of that action becoming visible to the distant user. Of course, using a broadband, always-on connection on both computers will speed things up.

In the end. With GoToMyPC, users get what they pay for. While it's not the bargain of the century, it's still a pretty good value. It's much easier and cheaper to use than a VPN or other market competitors such as PCAnywhere, but the service isn't as slick. But to the product's credit, tech support was courteous, prompt, responsive, and helpful. While the program may not work as flawlessly and as flexibly as we'd like, it does work. And best of all, with prices this low, the technology that was once a privilege of corporate types is now available to everyone. GoToMyPC is great to have on hand for those occasional days of telecommuting or for when the traveling notebook batteries go on a vacation of their own. Patient users will be able to get to their PCs, but this isn't the shortcut some may demand. It's more of a scenic route. ▲

most users are logging on because they need to access one of three things: e-mail; company-held data and files on the company network; and, most importantly, applications that aren't easily "Webified," such as ASPs, proprietary applications, or enormous databases that are impossible to replicate on a home or notebook computer and too security sensitive to offer simple dial-in access.

How It Works

The GoToMyPC network is designed to be as simple to operate as e-mail for the end user, but the technology that powers it is more intricate. A user visits the GoToMyPC Web site and remotely logs into her host computer. The Java Universal Viewer, a 200KB, multiplatform plug-in that serves as a window to the remote computer, automatically launches on the user's computer after she requests access.

Security. Expertcity's servers establish a secure connection using an SSL-encrypted site and 128-bit encryption and then work with the application server and the GoToMyPC database to dynamically generate Web pages that are, essentially, a constant and encrypted flow of "pictures" of the remote PC. Information between the host PC and the requesting PC is transported quickly between the two devices via the Expertcity network servers. For added security, users must enter multiple passwords and have the ability to disable the host computer's input peripherals while in use. CPU

by Karen Solomon

Top Brass: Interview With Expertcity CEO, Andreas von Blottnitz

One of the more tangible qualities of GoToMyPC and Expertcity's line of products is their ease of use and accessibility. CEO Andreas von Blottnitz was chosen for the job when the company secured its first round of financing in 1999 because he brings that brand of user-centered thinking to the company.

CPU: Who is the expected audience for GoToMyPC?

von Blottnitz: Our user is someone who has two computers, one at home and one at work, and an Internet connection. They use their computer mainly for work, and they are early adopters, not in the technology sense, but in the workplace sense; that they're always looking for a better way to get their job done. Many times users will discover and sign up for the service themselves and then have their company reimburse them.

CPU: What did you focus on as one of the most important characteristics of the GoToMyPC service during its development?

von Blottnitz: Other products in the field are focused toward technical people who are used to complicated interfaces and taking care of large systems. I'm not a geek at all, and I don't like stuff that's complicated. Simplicity was the key objective. I can and want to use it. That's the key differentiator between us and the competition.

CPU: What future goals do you have for the service?

von Blottnitz: We have many different marketing channels in operation at the moment to gain more corporate visibility. We believe this will be a standard office productivity tool, as in "Here's your door access code, here's your e-mail account, and here's your remote computer access code."

Competing Players: Who Else Will Go To Your PC?

GoToMyPC is aggressively recruiting users of other services with promises of ease of use and affordability. Here is a quick look at some of the competition.

pcAnywhere

Symantec
www.symantec.com/pcanywhere/Consumer
$179.95

pcAnywhere installs software on host computers and remote computers, enabling them to transfer files and share information.

LapLink Gold

LapLink
www.laplink.com/products/LLgold/overview.asp
$139.95 (download)
$179.95 (shipment)

LapLink Gold synchronizes data, accesses files, and reboots remote PCs.

VNC (Virtual Network Computing)

AT&T
www.uk.research.att.com/vnc
Free

This freeware works with a variety of platforms, but installation and configuration are targeting a very tech-savvy audience.

Timbuktu Pro

Netopia
www.netopia.com/software/products/tb2
Starts at $159.95

Timbuktu Pro is a multiplatform solution that allows for telecommuting and sharing information across a LAN, WAN, or the Internet.

THE BATMOBILE IS JET-POWERED.
BULLETPROOF. FIREPROOF.
AND REACHES SPEEDS OVER 300 MPH.
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by Chad Denton

Road Warrior

Gaming On The Go, Dial-Up Speeds Without Wires, HotSync Checkups & More From The Mobile Front

Portable Polygon Power

NVIDIA (www.nvidia.com) raised some eyebrows when it introduced its GeForce2 Go mobile chipset, but its latest product is likely to get road-weary gamers even more excited. The new chipset, code-named NV17M, promises to provide more graphics power while implementing a battery-friendly approach.

According to NVIDIA, the new chipset should manage to spit out roughly 500 million pixels per second and 30 million triangles per second. Although impressive for a notebook, this still lags behind desktop GPUs. NVIDIA's older GeForce2 Ultra, for instance, pumps out 1 billion pixels per second and 31 million triangles per second.

A VPE (Video Processing Engine) in the new chipset offloads video-intensive tasks from the CPU. Among other things, the VPE can handle decoding and playback of DVD movies without bothering the CPU. Advanced anti-aliasing smoothes jagged lines and improves image quality without hampering performance. NVIDIA claims its new Quincunx AA technology can provide 4X improvements in display quality while taking a performance hit similar to what you would normally see from a 2X improvement. In other words, you get smoother images without frame rates falling through the floor. (See "The Console Wars Get Technical" on page 31 for related information.)

NVIDIA's PowerMizer technology should help increase battery life. PowerMizer lets you strike the right balance between performance and battery life. In addition to controlling the GPU, PowerMizer also controls the CPU, LCD, and power supply settings.

The tiny chip can be implemented into a wide range of notebooks, from desktop replacements to ultraportables. The chipset's new design, known as MAP (Mobile AGP Package), puts the GPU and up to 64MB of frame buffer into a package the size of a normal GPU.

Chips are currently in mass production, and NVIDIA claims notebooks utilizing the new chip should be available early in 2002. ▲

4GB On A Postage Stamp

The first rule of thumb when it comes to digital storage is what you consider to be more than enough space today won't be nearly enough space tomorrow. Panasonic (www.panasonic.com/consumer_electronics/sd) is trying to stay ahead of the curve. The company has announced it will release a 256MB SD card in early 2002 and a 512MB SD card shortly after.

SD cards are beginning to be used in a wide range of components. Palm has announced support for the SD format, and its latest PDAs include a SD slot. Panasonic manufactures a wide variety of SD-enabled products, including cameras, MP3 players, and a car stereo that can play music from a SD card or a standard CD. Toshiba (www.toshiba.com) is also supporting SD cards in its new Portege 4000 series and Tecra 9000 series notebooks, as well as its e570 Pocket PC.

Looking ahead, Panasonic wants to have a 1GB SD card on the market before the end of 2002, a 2GB card in 2003, and a 4GB card before the end of 2004. At 4GB, it's possible to pack a feature-length movie into a card the size of a postage stamp. ▲

PDA Parts

We've heard of people leaving their PDAs on top of cars, knocking them into kitchen sinks, and even letting them become doggie chew toys. When disaster strikes, you may be able to send the unit back to the manufacturer for repair (probably for a price). Or you may simply have to buy a new PDA.

However, if you had access to the right parts, many accidents could be quickly and easily repaired at home. The problem is finding the parts. It's not as if you can walk into a CompUSA and buy a Palm Vx motherboard. If you know where to look online, however, you might find what you're looking for. Gethightech.com (www.gethightech.com) offers a wide range of parts for Palm, Handspring, and HandEra PDAs.

The exact parts available depend on the manufacturer and model. The majority of parts are for Palm hardware, but a nice selection of spare Visor parts is available, as well. HandEra and TRGpro parts are mostly limited to battery doors, flip lids, and other miscellaneous parts.

If you're feeling lazy, Gethightech.com will do the repair work for you, but doing it yourself does give you the excuse you've been looking for to open your Palm Vx. If you would rather buy a new PDA, Gethightech.com also buys broken and used PDAs. ▲

Palm's latest devices include support for SD media. Panasonic (www.panasonic.com) has plans for a 4GB SD card by 2004.

Dial-Up Speeds Roaring

A perennial problem with mobile data is the glacier-like speed at which information often seems to be flowing on mobile networks. In November, VoiceStream (www.voicestream.com) announced its iStream service, which should help speed up the flow of wireless data. The new service can send and receive data at up to 56Kbps, but VoiceStream claims the network typically averages around 40Kbps. Another advantage of the service is its always-on connectivity that eliminates the need to dial in. The new connectivity model also allows for a fairer revenue model, which bills users by the amount of bandwidth they use, not the amount of time they're connected.

VoiceStream operates what it calls a nationwide GSM network, although nationwide in this case doesn't necessarily mean it's available in every state. The iStream service uses a technology known as GPRS to supplement its GSM network and provide faster data transmissions.

The service starts at $2.99, in addition to your voice plan. That $2.99 buys you 1MB of bandwidth a month for your mobile phone. Watch your usage because an additional megabyte is a costly $10. For $19.99, users get 5MB and the price for each additional megabyte drops to just $5. Heavy users can purchase 10MB of bandwidth for $39.99. Additional megabytes cost $4 each. Because you can use the phone as a wireless modem, PDA users should consider the $19.99 plan and notebook users the $39.99 plan. According to VoiceStream, the service is only compatible with Pocket PC devices.

A Motorola Talkabout 193 or a Motorola Timeport 280 is required for use with the iStream service. At press time, service was available in parts of 38 states. ▲

Motorola's Timeport 280 is GPRS-ready and compatible with VoiceStream's new iStream service.

The 802.11 Trilogy

802.11a technology, such as these Proxim Skyline products, may get a push from 802.11g, which is just as fast as 802.11a but backward compatible with 802.11b.

From the folks who brought you the smash hit "802.11b" and the sequel "802.11a: Menace To Compatibility," comes yet another wireless standard. IEEE has approved the 802.11g standard, which will have data transfer rates of up to 54Mbps.

802.11a also promises speeds of up to 54Mbps, but 802.11g reaches these speeds while maintaining backward compatibility with 802.11b. While 802.11a uses the sparse 5GHz band, 802.11g will utilize the same crowded 2.4GHz band 802.11b uses, making backward compatibility possible.

For companies that have invested in an infrastructure that operates at 2.4GHz, backward compatibility will be a major plus. 802.11a has the advantage of not operating at such a crowded frequency. Cordless phones, microwave ovens, and Bluetooth all compete for space in the 2.4GHz band. This may be one reason why companies such as Intel, Proxim, and 3Com have already announced support for 802.11a. ▲

Troubleshooting HotSync

Ever dropped your Palm into its cradle, pressed the HotSync button, and watched as nothing happened? It kind of gives you a syncing (pardon the PDA pun) feeling in your stomach, not unlike the feeling you get when a twist of your car's ignition fails to produce a response from your engine. Palm's new Palm Checkup (www.palm.com/support/downloads/checkup) is the troubleshooter that can help solve your HotSync problems.

Palm Checkup requires Windows 95 or newer, a Palm-branded device, Internet Explorer 4.0/Netscape Navigator 4.75 or newer, and Microsoft JVM Version 3802 (available from www.microsoft.com/java/vm/dl_vm40.htm). Palm Checkup lets users automatically fix common HotSync problems listed in its Knowledge Base. For more complicated problems, Palm Checkup lets you submit a support request to Palm. Requests can be made day or night, and someone from Palm's support staff will reply by phone sometime between 8 a.m. and 8 p.m. EST. Replies are made on a first-come, first-served basis.

Palm Checkup can also help you stay up on regular maintenance by downloading and installing software upgrades. ▲

At Your Leisure

Compiled by Samit G. Choudhuri, Chris Trumble & Alex "Sharky" Ross

Plug In, Sit Back & Fire Away

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest in game consoles, games, PCs, DVDs, and just stuff we love, read on.

Half-Life: The Best PC Game Ever Comes To PlayStation 2

Gordon Freeman: MIT graduate, scientist, and butt-kicker extraordinaire.

In 1998, Sierra and Valve released an innovative FPS for the PC called Half-Life that some publications hailed as the best PC game ever. Some three years later, Sierra, Valve, and Gearbox have finally teamed up to give console gamers a shot at this incredible game on the PS2. Half-Life for PS2 revisits the events of the first PC release with some welcome graphical facelifts (not quite as sharp as the PC version with the Half-Life High Definition pack, but considerably cleaner than the original) and a new multiplayer minigame called Half-Life: Decay.

In the standard one-player game, you'll play Gordon Freeman, an MIT-educated research assistant who is forced to take up arms to survive an otherworldly onslaught when a high-tech experiment goes bad. The resulting tear in dimensional boundaries causes an assortment of nasty critters to periodically appear throughout the facility, endangering your mission to get to the surface and get help for those still trapped underground. To make matters worse, when the cavalry arrives in the form of elite military troops, you quickly realize they've come to clean up a potentially embarrassing mess and not to *save* anyone.

Half-Life: Decay sends you and a friend on several two-player cooperative missions throughout the same Black Mesa research facility. The added firepower is nice, but don't think Decay will be a cakewalk. You'll need every bit of it and some serious team skills to get through this excellent add-on.

And if, for some reason, you tire of the camaraderie of Decay, you can always switch to Half-Life's split-screen deathmatch mode and blow each other up real good. Long story short, the PS2 version of Half-Life is incredible. The control scheme is very good as console FPS games go, thanks especially to a very handy target lock-on button, and in case you're an FPS purist, the game supports USB mouse and keyboard play. ▲

Half-Life (PS2)

$49.99
Sierra
www.sierra.com

DVD Bytes by Todd Doogan

THE DIGITAL BITS.com
We Know DVD.

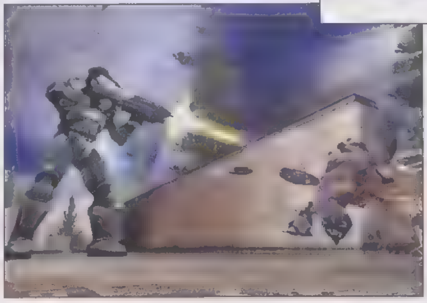
The Matrix Revisited

"The Matrix." You know it, you love it, and you can't wait for the sequels to hit theaters in 2003. For now, the next best thing is "The Matrix Revisited," a new and exhaustively well-done documentary from Warner Brothers. Through cast and crew interviews, digital conception art, and production footage, we get the stories about how the film came to be. This isn't just a look back, there's also an interesting look forward. The supplements include footage of training the cast is undergoing for the new films, as well as a look at the upcoming Japanese animated shorts that will appear on the Whatisthematrix.com Web site. For those willing to hunt, there are loads of Easter eggs with even more stories, the theatrical trailer, and more than 40 music tracks used in the documentary. If you are a fan, this disc is a deal at $19.95 (less than $15 online). ▲

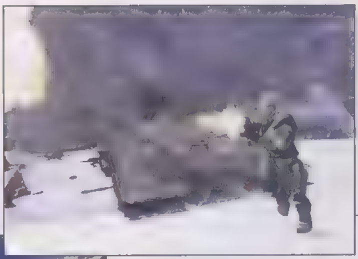
Halo: On This Ring I Thee Kill

In Halo, you're an elite cyborg trooper your human allies call Master Chief. As the game begins, your unit's starship arrives at a distant planet orbited by one run-of-the-mill moon and a strange ring-shaped moon/planet/thingy called Halo. The situation is grim; your ship is the last of an Earth armada decimated by an alien race called the Covenant, and they're in hot pursuit. In fact, Covenant troops are boarding your ship and the captain orders the crew and ship's troops to evacuate.

The captain has you thawed out of cryogenic sleep and tells you you're on the clock. You make your way through the ship and, eventually, down to the surface of Halo, where an ancient secret is waiting. The action is fast and furious and visuals and sound are amazing, but the truly remarkable thing about Halo is its story and the interactivity with your surroundings (a formula that worked quite well for Half-Life, as you may recall). You can pick up and use any weapons you find, friendly troops work with you in battle, and enemies range from extremely dumb to dangerously clever. Throughout the game, you'll come across several types of vehicles you can get into and drive, including Scorpion tanks, a couple of Covenant vehicles, and a very cool Jeep-looking ride called a Warthog.



Master Chief takes out the trash.



Halo's team-style combat lets you duke it out alongside such trusty allies as AI-driven Scorpion tanks.

The result is a game that blends pulse-pounding action with a refreshing strategy element, as you try to work with your troops to accomplish your objectives. And, of course, there's a full range of multiplayer cooperative and deathmatch options that are all great fun, but don't be surprised if the single-player mode ties you up for days. ▲

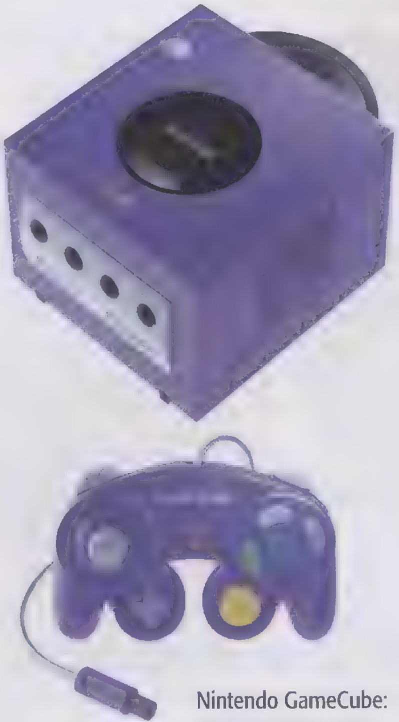
Halo (Xbox)

$49.99
Microsoft
www.xbox.com

Nintendo GameCube: Pretty In Black, Goofy in Indigo

A delay for the oddly colored toy boxes with handles and miniature controllers aside, Nintendo's new GameCube console launched with much aplomb. Packing a serious punch in terms of hardware, the console-war light is burning red-hot and brightly for the masses, thanks to Nintendo. The $199 GameCube—with a slower 475MHz IBM processor, only 40MB of memory, an ATI "Flipper" 3-D chip, and lacking hard drive and DVD capabilities—is arguably not as feature-rich as the Xbox (covered in our December issue). Before you write off GameCube, initial sales figures indicate it being a serious contender, possibly even outselling Xbox.

The excellent game lineup isn't as extensive as Xbox' just yet. Tiny 1.6GB DVD media harbor showcase titles such as Star Wars: Rogue Squadron II: Rogue Leader, which is igniting consumers' light sabers, while Wave Race: Blue Storm, FIFA Soccer 2K2, and Tony Hawk's Pro Skater 3 are all graphical dazzlers. Other titles, such as Luigi's Mansion and Super Monkey Ball, are aimed at a younger crowd with graphics that are "cute." Accessorizing with the GameCube currently includes a pint-sized TFT, controllers for adult-sized paws, high-definition cables, and a nifty Game Boy Advance link-up cable. Multiplayer online modem/broadband capabilities aren't featured yet but are slated to go live soon.



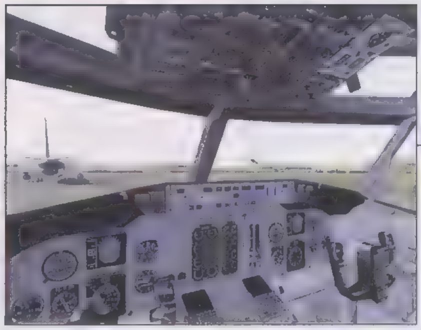
Nintendo GameCube: Isn't it just adorable?

GameCube is $100 cheaper and probably more practical than Xbox for old-school gamers that have grown up with Nintendo's gaming heritage, have children at home, and just can't get enough Star Wars. If you look hard, you'll find a more serious-looking black-colored unit, too. Adults with an appetite for destruction and a FPS shooter addiction (Halo, anyone?) or the need for a DVD player and a healthier wallet should go for the Xbox. The list of titles is currently looking longer and stronger than Nintendo's and the games also look decidedly more adult, thankfully sans Pokemon. ▲

GameCube

$199
Nintendo
www.nintendogamecube.com

Flight Simulator 2002: Getting Better All The Time



Taxiing for take off; ATC chatter adds a whole new dimension to flying the friendly skies.

Most armchair and wannabe pilots will find themselves in simulator heaven with Microsoft's latest iteration. But let's not jump the gun; this simulator is no substitute for real flight lessons, but it will definitely help you learn concepts that may result in saving money in flight school. Not interested in flight school and just want to log cross-country flight times? That's OK; you'll find much to enjoy as long as you don't expect aerial combat.

Previous iterations of this venerable franchise have been good, but frame rates always seemed on the low end no matter how fast your PC was. That's changed. The in-flight graphics are magnificent and have much more playable frame rates. Fly down the coast and see waves breaking against the shoreline, fly into major cities and be astounded by the density, see streaking rain, and so much more. This game's graphics have improved dramatically and it enriches the gameplay experience by further suspending your disbelief. Add in the ATC (Air Traffic Control) and the disbelief is perfect. The ATC probably isn't as complex as the real deal, but it adds a new dimension to take offs and approaches.

Microsoft Flight Simulator 2000 introduced a Basic and Professional Edition, and Microsoft has chosen to go with that sales model again. Nearly anyone with a basic interest in flying will find plenty to enjoy in the Basic Edition. Enthusiasts should look closer at the Professional Edition, which includes such new aircraft as the Cessna 208 Caravan on Amphibious Floats, Boeing 747-400, Cessna 172S Skyhawk SP, Cessna 208 Grand Caravan, and Raytheon BE58 Baron (the first three aircraft are new to the Basic Edition, as well). Another Professional feature is the ability to link PCs and set one up as an Instructor's Station where the instructor can control equipment failure and weather to challenge a student. The Professional Edition also has gMax, a 3-D modeling tool for easily creating objects, such as more aircraft, for use in the game.

Microsoft Flight Simulator 2002 is the new benchmark in civilian flight simulations. You owe it to yourself to buy this game if you have any passion for flying and can live without the dogfights. Oh, and Microsoft, please include a PAPER manual next time; that's the feature we still miss most from Flight Simulator 1998. ▲

Flight Simulator 2002 (PC)

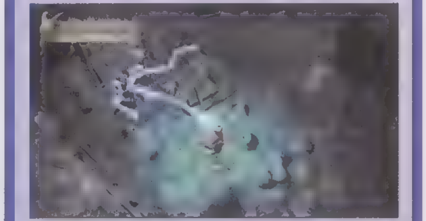
$54.95 (Basic) / $74.95 (Professional)
Microsoft
www.microsoft.com/games/fs2002

Check These Out On The Web

Check out our reviews of Dead or Alive 3 (Xbox), Baldur's Gate: Dark Alliance (PS2), and NFL Fever 2002 (Xbox) at www.smartcomputing.com/cpumag/feb02/gamereviews.

Just look at DOA3's rich, perfectly textured backgrounds.

Colts defensive end Chad Bratzke strikes a pose in NFL Fever 2002.



The dark backgrounds in Baldur's Gate: Dark Alliance light up nicely with magic.

Battle Realms: Everyone's Kung Fu Fighting

This first release from developer Liquid Entertainment is no ordinary 3-D RTS. Battle Realms is to the average RTS what a diamond is to a cubic zirconium; the game oozes style, quality, and, flavour. Battle Realms features solid gameplay in a land of martial arts, and actually lives up to its advertised hype.

Gameplay starts out looking a bit ordinary but improves dramatically with a few levels. Nuances in resource and combat management are plentiful. You can play as one of four clans, which are all well balanced. The campaign mode lets you choose between two clans as you assume the role of the son of an old Serpent Lord returning home.

Save villages and choose your destiny. The decisions you make affect the storyline.

Besides being stylized, the game is also attractive. Not too many RTS titles let you use the in-game engine's close-up view for cut scenes. But even that works to good effect. Not being able to create formations or have as much control of soldiers is nitpicking, but the complaint fades after seeing your armies in glorious combat. ▲

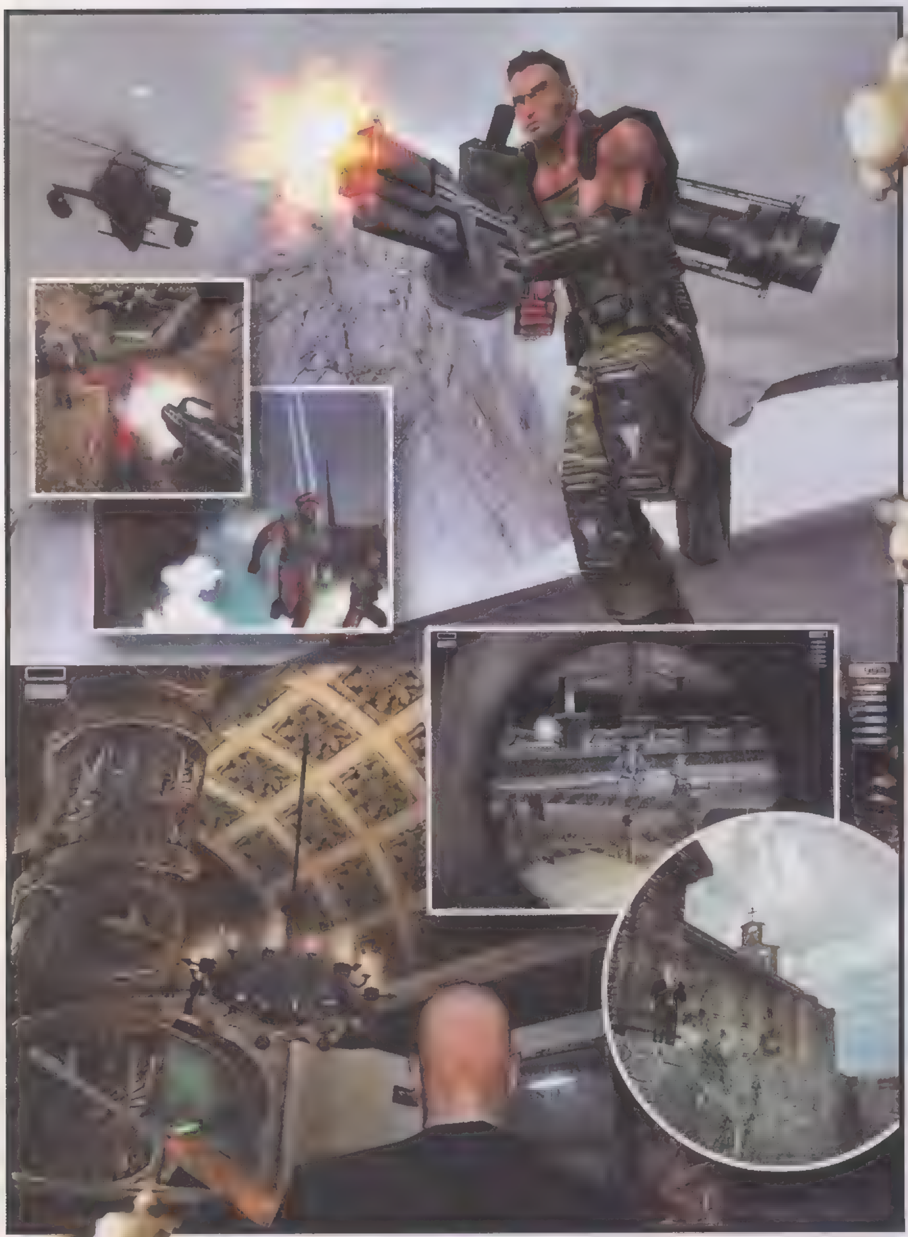
Battle Realms (PC)

$49.99
Ubi Soft Entertainment
battlerealms.ubi.com

Hot Shots: The Beauty Of The Game

Yeah, we know it's all about the gameplay. Who needs eye candy? Remember how awesome games like Alone In The Dark, Quake (3-D accelerated on Rendition's Verite), and Falcon 3.0 on a high-end i386 looked in their heyday? We know that great graphics don't hurt. There's nothing better than stellar gameplay combined with knockout graphics to make that killer game. Let the polygonal eye candy shine . . .

Top: Command & Conquer: Renegade. Step into the shoes of GDI captain Nick "Havoc" Parker (shown here), the commando from the original Command & Conquer. Westwood Studios lets you get down and dirty and personal against the Brotherhood of NOD. Renegade is a whole new experience; being *in* the world of C&C is very different from the sterile RTS approach. **Bottom: Hitman 2: Silent Assassin.** IO Interactive is hard at work on this follow-up to the original for Eidos Interactive. An enhanced version of the in-house Glacier engine is being used. Let's hope the derived gameplay fares better than the original.



Infinite Loop

Old-Fashioned Effects

It's hard to imagine a movie without computer-generated special effects. Computers made dinosaurs come to life in "Jurassic Park." Gary Sinise appeared handicapped in "Forrest Gump" and the Titanic sank again. But what about movies before computers dazzled our eyes with illusions? Bet you didn't know just how ingenious these effects were.

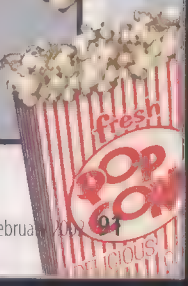
"The Ten Commandments" (1923): Before Cecil B. DeMille directed Charlton Heston in the 1956 remake, this 1923 version shows Moses parting a Red Sea made out of Jell-O.

"The Wizard of Oz" (1939): The tornado that whisked Dorothy somewhere over the rainbow was really a 35-foot muslin stocking. Maybe Bill Paxton and Helen Hunt would've had an easier time in "Twister" if they had been chasing stockings.

"It's A Wonderful Life" (1946): The snow falling in Frank Capra's classic was made out of foamite (a fire-fighting chemical), soap, and water. The mixture was pumped through a wind machine at a high pressure to create the effect of silent, falling snow, allowing Capra to record sound live. Films before this used cornflakes painted white, which fell too loudly, resulting in dialogue being dubbed in later.

"Psycho" (1960): Alfred Hitchcock used chocolate sauce for blood in this black-and-white horror film.

Sources: International Movie Database (www.imdb.com), "Special Effects: Titanic and Beyond" (www.pbs.org/wgbh/nova/specialfx2)



MACRO MANIA, PART III

Digging For Code

OK, you've become pretty good at creating Excel macros by using the macro recorder, but you're hungry for more. You want to dig into some programming code and exert more control over how Excel does its business. When you say "jump," you want Excel to say, "how high?"

Good thing that VBA (Visual Basic for Applications) comes packaged with every copy of Excel. Getting a handle on this powerful programming language can help you dramatically improve your productivity, control how Excel operates, and modify which Excel commands and features are available when others use your workbooks. VBA is logical and relatively easy to pick up; even though you might just be getting your feet wet in VBA, Excel provides ample help so you can continue to sharpen your programming skills.

Of course we'll help, too. We'll explain how VBA is set up, work you through some sample programming code, and show you how to explore VBA on your own. The world of VBA is huge, so you won't become an instant expert by reading this article. But it will put you further on the path than most people. And if you like what you see here, tune in next month as we dive even deeper into VBA.

Before we start, it's helpful to know there isn't a lot of difference between Visual Basic and Visual Basic for Applications except that VBA needs a host application (such as Excel) to run. The commands in Visual Basic and VBA are virtually the same, which makes it a snap to program in one of them if you already know the other. Furthermore, while you can record macros and then tweak the associated code, you can also write code completely from scratch. But no matter how you create the code (via the macro recorder or from scratch), it's stored as a series of steps (a procedure) in a module. A module is just a collection of procedures. You can see a module's contents in the Visual Basic Editor. With those thoughts in mind, let's get started.

Behind The Scenes

If you read our previous two Macro Mania articles, you already know how to develop macros using Excel's macro recorder. Like a tape recorder, the macro recorder keeps track of your every mouse click or keystroke so that you can later play it back by clicking a button or using a keyboard shortcut. To view the programming language that Excel simultaneously creates whenever you record a macro, display the Visual Basic Editor. The Visual Basic Editor is part of Excel, and it automatically opens (and closes) whenever you launch or exit the program.

To open the Visual Basic Editor and view the VBA code for a specific macro, press ALT-F8 in any workbook. In the Macro dialog box, click a macro and then choose Edit. The Visual Basic Editor displays so you can view, write, or edit programming code, using the same techniques you would use in a word processor.

You can still display the Visual Basic Editor and then write VBA code from scratch even if you don't have any macros in a workbook. Choose Tools, Macro, Visual Basic Editor to do so. In the Editor, choose Insert, Module, which creates a blank, electronic "page" (sometimes referred to as a module). You can use this space to write, edit, and store code.

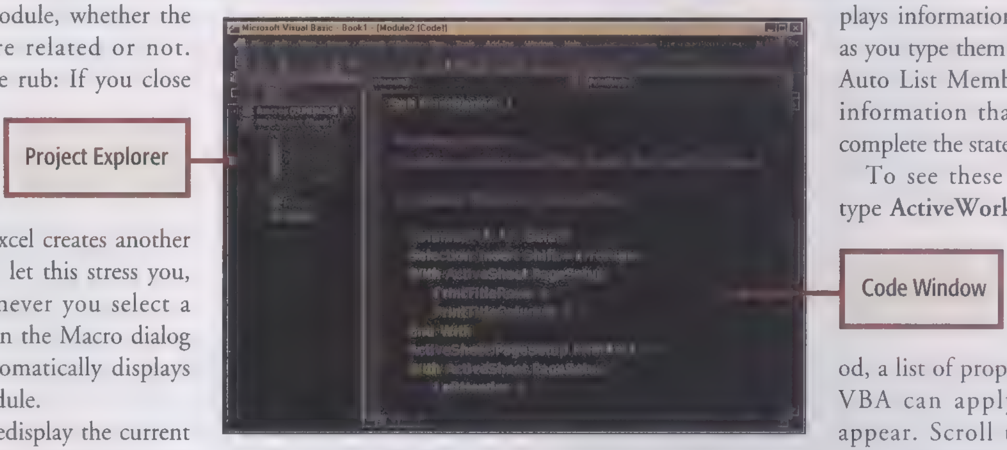
Take A Tour

So you can cruise around it more efficiently in the future, take a quick tour of the Visual Basic Editor's window now. While the elements that display in the Editor depend on which you choose from the View menu, the most commonly displayed ones are the Module Code and Project Explorer windows. The Module Code window provides a place to write, view, and edit Visual Basic code. Each

Illustration: Andria Schultz

module includes its own Code window, which may include several procedures. The Project Explorer window shows a hierarchal graphic of how the modules in your workbook are set up. You can click a module in the Project Explorer to see which procedures it includes.

By the way, each time you record another macro in the same workbook, Excel adds the new macro to the bottom of the same module, whether the procedures are related or not. Now here's the rub: If you close the workbook and then reopen it to record new macros, Excel creates another module. Don't let this stress you, though: Whenever you select a macro to edit in the Macro dialog box, Excel automatically displays the correct module.



The Visual Basic Editor takes you behind the scenes of Excel so you can tweak the code that makes your macros work.

Finally, to redisplay the current Excel workbook, click the View Microsoft Excel button on the Visual Basic toolbar or click View, Microsoft Excel. And for a really quick way to toggle between Excel and the Visual Basic Editor, press ALT-F11.

Objects & Such

Now that you know how to get around the Visual Basic Editor, look at how you can use VBA language to control Excel. Basically, you use VBA to manipulate objects, such as workbooks, ranges, or charts, in Excel. When you write code in VBA, you first specify an object and then indicate which related property should be changed or which action should be performed on it.

Think of it this way: Imagine that your dog is an object. You can pet the dog (performing an action on the object) or train the dog (changing the dog's properties). In VBA code you'd write it something like this: Dog.Pet (an action); Dog.Train (changes the property). Real VBA code looks similar: ActiveWorkbook.Close (an action); Selection.Font.Bold = True (changes the property of the selection). Keeping this analogy in mind can make VBA concepts a little easier to understand.

A Little Help From Your Friends

As you begin to dig into VBA code, you'll soon discover there are numerous objects (such as range, cell, or workbook) and procedures that you can control. Luckily, Excel gives you a hand as you're developing code. For example, when you record a macro, Excel automatically creates a skeleton of the code. So recording a macro and then viewing the associated code can help you grasp how VBA "thinks" and gradually get used to the structure for coding.

You can also use Visual Basic's extensive Help system to get a handle on programming. For example, if you type a common keyword, such as **date**, in the Visual Basic Editor's Code window and then press F1, Excel opens a Help window with context-sensitive help about the keyword, including examples. For a bit more practice, try copying sample code from Help into the Code window and then running it (in a noncritical workbook, of course).

If you have a few minutes (or hours) to kill on a Saturday afternoon, grab a cup of coffee and display the Contents page of the Visual Basic Editor's Help window. Sip away as you research (almost) everything you ever wanted to know about VBA, including information on the user interface, concepts, and how-to tips and tricks.

Another tool for finding out more about VBA code is the Object Browser. As its name implies, you can browse through objects to learn more about them. To display the Object Browser, choose View, Object Browser or press F2. Click a class (such as Range), and you'll see the methods and properties that belong to it.

Finally, you can rely on some of VBA's built-in help tips, such as Auto Quick Info and Auto List Member. As default settings, these options are probably turned on; if not, you can display the Editor page of the Options dialog box and then check the appropriate boxes. Auto Quick Info displays information about functions as you type them in the Editor; the Auto List Member feature shows information that would help to complete the statement.

To see these tools in action, type **ActiveWorkbook.**(an object) in the Code window. As soon as you type the period, a list of properties and actions VBA can apply to the object appear. Scroll through the list until you find the one you want and then press ENTER to place the code within the Code window. For example, you can select Close so your complete statement would be ActiveWorkbook.Close; this closes the active workbook.

Practice Makes Perfect

Now look at some more sample programming code. First, record a quick-and-dirty macro called MakeBold. Start the macro recorder, click cell A1, and then click the Bold button before turning off the recorder. Let's see how this simple macro appears in Visual Basic: Open the Macro dialog box, select the MakeBold macro, and click Edit. You'll see code that looks something like this:

```
Sub MakeBold()
'
' MakeBold Macro
' Macro recorded 2/1/2001 by Linda Bird
'
' Keyboard Shortcut: Ctrl+Shift+B
'
    Selection.Font.Bold = True

End Sub
```

The translation? The Sub and End Sub lines indicate the beginning and ending of the procedure. The apostrophes at the beginning of the first few lines mark the text on those lines as comments instead of executable code. You'll probably notice that the comment lines correspond with the information you put in the Record Macro dialog box. If you're writing VBA code from scratch, you can create your own comment lines by typing an apostrophe at the beginning of the line. You can also type **Sub**, followed by the name for your procedure (such as Sub MakeBold) to start a new procedure.

Now, think lunchtime . . . and sub sandwiches: The Sub and End Sub lines are the bread, and the meat is the code between these lines. For example, in the above macro, the Selection.Font.Bold = True statement does all the work. The statement isn't too hard to interpret if you can get into VBA's mindset. Selection means the currently selected cell or range; Font.Bold represents a property, or attribute for the selection. Of course, the = True part of the statement means that the selection contains, or owns, the property.

Now try editing the code. In the Code window, select the word True and change it to False, which changes the property (Bold) from being applied to NOT being applied. To test your modification, redisplay the Excel workbook and select any cell that is currently formatted using Bold. Run the MakeBold macro, and the formatting will be removed. Just for fun, change the property back to "True" and then rerun the macro. You'll find that any range selected at the time you run the macro will be instantly transformed from normal font to bold.

You can use the Object Browser in the Visual Basic Editor to see which methods and properties belong to an object.

Change Multiple Properties

OK, you've used a macro to change a single property (bold) for a selection. But as you've probably guessed, you can modify many properties with a single statement. For example, imagine that you want to change the titles in your workbook so they display as bold and at 45 degrees. To do this using the Excel interface, you would open the Format Cells dialog box and then change the options in the dialog box. Each of the options in the dialog box has an associated statement in VBA. Even if you only change one option on a page in the dialog box, the macro shows multiple property settings, each exactly corresponding to the controls in the Format Cells dialog box.

Let's test this concept. Record a macro called Titles. Start the recorder and then display the Alignment page of the Format Cells dialog box. Change the orientation to 45 degrees and then click the Font tab to display its page. Modify the font style for the selection to Bold and then close the Format Cells dialog box. Finally, turn off the macro recorder. Switch to the Editor so you can view the code you created. It should appear similar to the following code:

```
Sub Titles()
' Titles Macro
' Macro recorded 2/1/2001 by Linda Bird
' Keyboard Shortcut: Ctrl+Shift+T
    With Selection
        .HorizontalAlignment = xlGeneral
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 45
        .AddIndent = False
        .ShrinkToFit = False
        .MergeCells = False
    End With
    With Selection.Font
        .Name = "Arial"
        .FontStyle = "Bold"
        .Size = 10
        .Strikethrough = False
        .Superscript = False
        .Subscript = False
        .OutlineFont = False
        .Shadow = False
        .Underline = xlUnderlineStyleNone
        .ColorIndex = xlAutomatic
    End With
End Sub
```

Notice the macro shows a number of property settings, each corresponding to options in the Format Cells dialog box. Here's the bottom line: Even though you only changed a single property on each page in the Format Cells dialog box, Excel made a note that you looked at all the other options on each page, as well. (Each of the options is set "False," indicating it's not turned on.) In other words, the macro recorder records all the possible property settings even if you only modified the value for a couple of them.

You can delete the extraneous lines of code if you want. This helps to clean up the macro and make your code run faster. To do this, move the pointer to the left edge of the line you want to delete until the pointer changes to a right-pointing arrow. Click to select the entire line and then press Delete. Click the Save button at the top of the Visual Basic Editor to save your changes.

Next month we'll help you hone your programming skills even more. Until then, try writing some VBA code and make Excel jump through hoops.

by Linda Bird

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WARM UP TO PENGUINS

Put Linux On Your Desktop

LINUX GETS A LOT OF LOVE FROM MANY USERS AS AN OS FOR SERVERS, BUT LINUX HAS ALSO BEEN SOMETHING OF A RED-HEADED STEPCHILD OF OPERATING SYSTEMS FOR DESKTOPS.

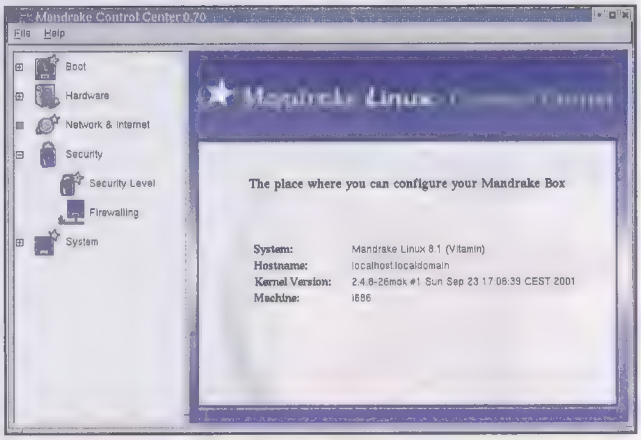
The desktop Linux postmortem articles are usually correct. Linux isn't going to make its way onto the desktops of the common user any time soon. What those articles sometimes omit, however, is Linux is a viable desktop choice for many users.

For those willing to invest the time to learn a new operating system, they will be rewarded with an OS that's stable and has a wide selection of applications, most of which are free. We'll give you the basics of installing various Linux distributions in this article. In coming months, we'll dive into more complex Linux issues.

Name Your Flava

Linux is all about choice, and the variation of Linux distributions means Linux users can usually find a flavor that best fits their tastes. Below are some of our thoughts about some of the more popular Linux distributions available.

Red Hat. Probably the most recognized brand name in Linux is Red Hat (www.redhat.com). It shines best as a workstation OS. If you're primarily interested in a stable, solid OS for productivity purposes, Red Hat may be the best choice. Although Microsoft Office isn't available for Linux, a number of open source office suites, including OpenOffice and KOffice, are maturing. Sun's StarOffice runs on Linux and is free to download. The Red Hat 7.2 Professional version we installed included StarOffice 5.2.



The place where you can configure your Mandrake Box

System: Mandrake Linux 8.1 (Vitamin)
Hostname: localhost.localdomain
Kernel Version: 2.4.8-26mdk #1 Sun Sep 23 17:06:39 CEST 2001
Machine: i686

Mandrake is known as a newbie-friendly Linux distribution. Much of that is because of the configuration tools and wizards you will find within the Mandrake Control Center.

Red Hat does have a few configuration tools. For example, Red Hat uses GNOME Lokkit as a firewall configuration tool for quickly setting up basic firewalls. Still, Red Hat doesn't have as many configuration tools as SuSE and Mandrake. Our Red Hat installation process was very smooth and managed to automatically detect and configure all our hardware.

Red Hat ships standard Red Hat 7.2 and a Red Hat Linux Professional package. The Professional package includes server and workstation applications, games and utilities, and a business card-sized System Administrator Survival CD.

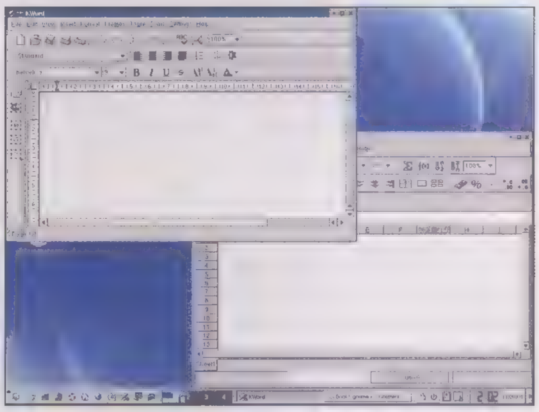
Mandrake. Mandrake (www.linux-mandrake.com) has a reputation for being a good, newbie-friendly desktop distribution. We see no reason to argue. Our installation of Mandrake Linux 8.1 was very smooth. The Mandrake Control Center includes a number of tools to help you configure your Linux system after installation. From the Control Center, you can quickly set up a simple firewall and configure Internet connection sharing.

Mandrake does have some small problems that may be big inconveniences for new users. For starters, the floppy drive is inaccessible from Mandrake on some systems. The fix is easy enough, and instructions are available on Mandrake's Errata page (www.linux-mandrake.com/en/errata.php3), but even the instructions may baffle inexperienced users.

The second issue involves users who purchase a retail version of Mandrake and attempt to install NVIDIA 3-D drivers. If you install the drivers and attempt to boot into a graphical environment, the screen will flash several times before exiting to a command line. The cause is a simple command that Mandrake doesn't execute after installing the drivers. The problem is easy to solve, but it shouldn't have made it into the final version. This is only a problem if you configure 3-D support for a NVIDIA graphics card.

Mandrake offers a variety of retail versions, including a ProSuite version that includes a wide range of server applications, a PowerPack edition for workstations,

Yep, that's the Goth family from EA's The Sims, and yes, this picture was snapped from a Mandrake distribution. The Mandrake Gaming Edition bundles a special version of The Sims for Linux.



Who says Linux is all about the command line? This Red Hat system is running the KDE graphical environment, along with KWord and Gnumeric.

and a standard edition. In November, Mandrake released a gaming edition that includes the popular PC game The Sims. This specially designed version of The Sims was written to run on software from TransGaming (www.transgaming.com).

SuSE. SuSE 7.3 (www.suse.com) includes some impressive security applications and, like Mandrake and Red Hat, has a slick graphical installation program. YaST2 provides an easy interface for configuring the system and installing software. We did have some problems with SuSE on one of our test systems. When exiting a graphical environment, the system would consistently hang with a blank screen.

YaST2 includes a series of configuration tools to help you share an Internet connection, construct a firewall, and perform other chores. These tools aren't quite as simple as the ones included in the Mandrake Control Center, but they are a bit more flexible. A Logical Volume Editor lets you resize Linux partitions without destroying data.

SuSE offers both a Personal and Professional version of 7.3. The Professional version includes seven CD-ROMs or one DVD with roughly 2,300 packages. SuSE bills the three-CD Personal Edition as a package best suited for newcomers.

Procure The Penguin

You've undoubtedly seen Linux distributions on the shelves of Best Buy or CompUSA. Retail versions typically run between $40 and $90 and include extra software, limited technical support, and documentation. The documentation is a nice extra for new Linux users, but you may not be willing to shell out $40 for software you're not sure you're going to use.

Of course, you can download Linux distros, as well. The download versions don't come with technical support or documentation and often lack third-party commercial software found in retail versions. Software, such as NVIDIA 3-D drivers, Adobe Acrobat Reader, StarOffice 5.2, and the Opera Web browser, are left out of the download versions but can be downloaded separately and installed manually. Check out the distributor's Web site for a list of mirrors you can download from or check out www.linuxiso.org for a list of Linux iso images ready to burn to a CD-R.

You need time and bandwidth to download a Linux distribution. If you don't have enough of either, you can purchase a burned CD-R from Web sites such as Cheapbytes (www.cheapbytes.com) and Linux Mall (www.linuxmall.com). These download versions cost less than $10 (plus shipping and handling) and are a great way to get a sample distribution before committing to a retail package. Again, these cheap versions come with no technical support or documentation and contain less software than the retail versions.

Check List

Before you install Linux, you need to get your PC ready. This includes checking for hardware compatibility, recording hardware settings, and making room for Linux on your system.

Hardware compatibility. In most cases, your hardware will probably be compatible with Linux, but it's always good to check before you attempt an install. Most Linux distributions include a database of supported hardware. Below are hardware compatibility pages for our three distributions:

- Mandrake; www.linux-mandrake.com/en/hardware.php3
- Red Hat; hardware.redhat.com/hcl/genpage2.cgi?pagename=hcl
- SuSE; hardwaredb.suse.de/index.php?LANG=en_UK

Gathering information. If you have Windows installed on your system, you will want to gather the IRQ and I/O addresses for the hardware that's not PnP and any ISA PnP hardware. Supported PCI cards should be automatically detected.

Move over Windows. Once you're confident your hardware will run Linux, it's time to clear room to install your new OS. Because each OS requires its own partition, it's not as simple as deleting programs or files to free up space on your hard drive.

Mandrake and SuSE contain tools that let you resize Windows partitions during installation without destroying any data on those partitions. Red Hat includes a FIPS tool that can do the same thing, but it doesn't have a pretty graphical interface and you must run it prior to installation. You'll find the instructions for using FIPS on the installation CD in the DOSUTILS/FIPSDOCS directory.

If you run a NTFS file system with Windows NT/2000/XP, you won't be able to resize your partitions without destroying data or purchasing a commercial utility.

PowerQuest's Partition Magic (www.powerquest.com) works with NTFS partitions. If possible, you might want to create an additional FAT32 partition. Linux can read NTFS partitions, but it can't write to them. Linux and all versions of Windows fully support FAT32.

If you can devote a partition to Linux or have unpartitioned drive space (possibly from a second hard drive), you can proceed to the installation.

Installation

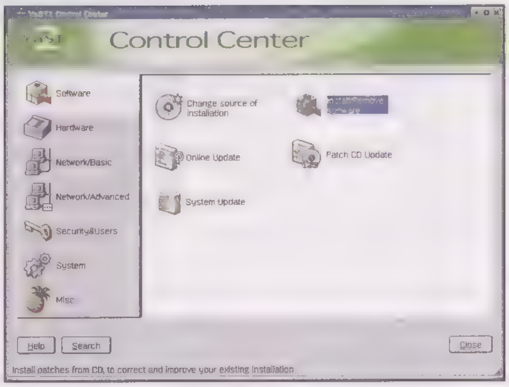
Linux installation has come a long way since the early days of the OS. Most distros now have nice graphical installation programs that configure most aspects of your system for you. We'll examine some of the more complex portions of the installation procedure.

Partitions. You'll need to create at least a root partition and a swap partition. Installation programs can usually configure this automatically and are careful not to delete existing partitions without first asking your permission.

If you manually configure your Linux partitions, know that Linux doesn't use letters to refer to drives. Instead, all drives, fixed and removable, are mounted at a point in the directory hierarchy. The root directory is the uppermost directory and is specified by a forward slash (/). Other partitions and drives can be mounted at specific points in the directory structure. For example, one partition may house the root directory while a second may house the /usr directory and its subdirectories. Removable media are often mounted in directories such as /mnt/cdrom or /mnt/floppy. If you configure your Linux partitions manually, you'll be able to specify partition mount points.

Each drive also has a device name, which isn't used much after installation. You should still know the naming scheme so you can make sense of what partitions are mounted where in your directory structure. The master and slave device on the first IDE channel are referred to as hda and hdb, respectively. The master and slave devices on the secondary IDE channel are labeled hdc and hdd, respectively. A number represents each partition after the device name. Primary partitions are labeled 1 to 4, while logical partitions start at 5. Thus, hda1 is typically the Windows directory and hdc is usually the CD-ROM drive.

If you configure partitions manually, you'll also need to select a file system. Linux has full support for a number of file systems, including FAT16 and FAT32, but it must operate from a partition with a special file system. For a long time, ext2 was the Linux native file system. Recent releases of numerous journaling file systems have changed that. If your system loses power, a journaling file system will prevent data from being corrupted. This means no lengthy disk scans when you restart the system. SuSE and Mandrake support ext3, ReiserFS, and JFS journaling file systems. Red Hat only includes support for ext3.



Install patches from CD, to correct and improve your existing installation

SuSE's YaST2 provides various system configuration tools. Though not as easy as the configuration tools in Mandrake Control Center, they are a little more flexible.

Package selection. With your partitions configured, decide what software you want to install. You can select broad categories of applications, or you can flip through a list of available software and decide exactly what you want installed.

Part of the Zen of Linux is the interrelatedness of software packages. Remember this when adding or removing packages. A warning lets you know when adding or removing a file will cause dependency problems.

Final configurations. All three distros let you configure most aspects of your system, including peripherals. The process is typically smooth. Most hardware will be automatically detected and configured, but you may need to provide specific information.

Configuring XFree86 is the most important configuration step. XFree86 provides the foundation on which all graphical environments operate. The installer will usually configure XFree86 for your video card, but you'll need to select the color depth and resolution. If able, test your configuration during the installation process.

You'll also need to configure a boot loader. Usually, this will be written to the MBR (Master Boot Record) of the hard drive. The boot loader lets you select the OS you want to use. The installer should detect other OSes and configure the boot loader appropriately. LILO and GRUB are the most popular boot loaders, and you may have a choice between the two. Instead of writing LILO to the MBR, SuSE prefers to save it to a floppy. If you roll with the default selection, you'll need to boot from the floppy anytime you want to load SuSE. If you lose the floppy or it gets corrupted, you'll need the SuSE installation CDs.

Time To Play

Installing Linux really is pretty painless. After the system reboots, enter the username and password to log on to your system and have fun exploring. CPU

by Chad Denton

Infinite Loop

Are You Sharing?

According to Jupiter Media Metrix, 6.9 million Americans were using P2P networks other than Napster in August 2001. Napster users fell to 5.5 million. That makes roughly 12.4 million P2P users.

According to www.nua.com, a Web site that tracks Internet statistics and trends, roughly 116.1 million Americans are currently online. That means roughly 1 in 10 Americans who are online are sharing data via P2P networks.

KILLER HARDWARE TIPS

Too Cool To Follow Rules

IF YOU'RE A USER WHO CAN'T LEAVE THINGS ALONE IF THERE'S A CHANCE YOU CAN MAKE THEM BETTER, EVEN IF IT MEANS BUCKING THE NORM, READ ON. WE HAVE some tips and tricks that just might help your system look cooler and make you more productive.

Change What It Means To See Windows

So you've tricked out your PC with the latest video card, pretty rounded cables, and other gadgetry. Don't go and stuff that beautiful techno-wizardry into a sealed aluminum box. Show it off by installing a window in the case. Then add a light to illuminate those components.

"Those who spend a lot of time tweaking and upgrading often install a window to show off the internals," says James Cameron, spokesperson for PC Case Gear (www.pccasegear.com). "We've seen more than one happy GeForce3 owner who has installed a window purely to show off the latest hardware. Another customer used a window to display an elaborate water-cooled setup that he had personally installed. LaserLEDs were strategically placed to highlight the radiator and waterblock."

Installing a window involves cutting a hole in the case's side with a jigsaw or rotary cutting tool. An acrylic or other clear plastic sheet fills the gap, which is then sealed with rubber molding.

Two popular choices for the lights are neon and cold cathode, which is a type of fluorescent light that's brighter and more compact than neon lights. It's also much more expensive. At PC Case Gear, a cold cathode kit costs $89, while neon costs only $38. The light resides inside the case and gets juice from the PC's power supply. Both types of light are available in a rainbow of colors, including ultraviolet neon for a black-light effect. Neon and cold cathode illuminate a large area, while LaserLEDs can provide spot lighting for your favorite components. You can find window and light kits at www.pcmods.com, PC Case Gear, and other sites.

Can you illuminate your PC without buying a kit? You probably won't find cold cathode lights at a hardware store, but for acrylic windows and standard neon, "it is possible to do this yourself using commonly available parts," Cameron says.

Would you like a window seat? Add some flare to your PC (and show off your boss state-of-the-art components) by fitting the system's case with a transparent window and installing internal lights.

I Need Some More, Uh, What's It Called Again?

Last year, computer memory prices sagged and dipped, and just when everyone thought they were as low as they could get, they dropped even more. If you have a few dollars in your wallet—heck, if you find some loose change in the couch cushions—now is the time to buy more RAM.

RAM prices have been driven down by that Economics 101 standard: supply and demand. PC manufacturers are the largest buyers of memory, but as we all know, demand for new PCs has fallen. Now memory manufacturers have a glut of RAM on their hands.

To find the best memory deals, visit DealRam (www.dealram.com), a price comparison service dedicated to computer memory. But before you buy, determine if you'll need to upgrade to a motherboard that's compatible with DDR-RAM. DDR provides twice the bandwidth of PC133 RAM, which translates to a 10% to 20% gain in real-life performance.

Not all major PC manufacturers have jumped on the DDR bandwagon yet. "But we expect them to," says Erin Hurley, spokesperson for memory retailer Crucial Technology (www.crucial.com). Why the delay? At first, DDR was practically synonymous with AMD processors. Those days are over. Intel is expected to release its new DDR-compatible chipset, dubbed 845 DDR, in January.

"Those who build only with Intel components have had to wait for DDR technology because the P4 was first designed with Rambus technology. This forced a few major PC manufacturers to choose the more expensive Rambus technology to keep up with the curve. However, AMD has been pushing DDR technology for the past several months, and we have seen many of these major PC manufacturers choose the AMD/DDR solution as a less expensive alternative to performance PC computing," Hurley says.

The SiS645 chipset is to support both SDRAM and DDR, so you can slap in whatever memory modules you have handy. "When Intel releases their P4/DDR chipset, we expect the remaining PC manufacturers to adopt DDR technology in their performance and budget PC product lines," Hurley says. As a result, Crucial expects the popularity of DDR to surpass PC133 for good.

Give It Away—Wirelessly

Sure, a wireless network that connects all your home computers to a broadband Internet connection is cool, but those Wi-Fi waves also reach beyond the walls of your home. A growing number of users are opening their wireless network to neighbors.

Free wireless community networks, known as OpenNAPs or freenets, are sprouting up all over. All it takes is a Wi-Fi (or 802.11b) router and a willingness to share your bandwidth with neighbors or passersby. Some users are even replacing the antennas on their routers with homebrew models—a favorite is a powerful yagi built from a Pringles can (check out www.oreillynet.com/cs/weblog/view/wlg/448).

Copious information about how to set up a wireless network and hack your own antenna is available from AirShare.org and WirelessAnarchy (www.wirelessanarchy.com). Run a captive portal or use "-open" as part of the network ID to make it clear to others your network is to be shared.

"Why not share a resource that does not have any incremental cost?" says Cliff Skolnick, a member of the Bay Area Wireless Users Group (www.bawug.org). "I've never gotten any compensation, but I know others who have gotten goodies backed by neighbors or cash informally from users." Skolnick maintains a list of public wireless networks in the San Francisco Bay Area (check out www.toaster.net/wireless/aplist.php). Sharing your Internet connection is a laudable idea, but make sure it's really yours to share. Your access provider's appropriate use policies may prohibit sharing access. If it does and you're caught, you won't have any Internet access to share, not to mention you could end up on the wrong end of a lawsuit.

"When someone sets up an unauthorized, wireless way to hook up friends or family members without charge, that is contrary to our service agreements. It is the same thing as cable theft and is against the law," says Mike Luftman, spokesperson for Time Warner Cable, which owns Road Runner.

Even if you're not into giving Internet access to every notebook user at the bus station down the block, improving the dinky antenna on your Wi-Fi router can have other advantages. We know of one user who built two directional antennas, mounted one on his roof at home and one at work two miles away, and now enjoys his office's lightning-fast Internet access from the comfort of his couch, with the boss' permission, of course.

A Rat's Nest Of Wireless Mice

The mouse is arguably the device with which we interact most; divorce the gummed-up ball and tangled cable. Wireless optical mice forgo cables, mouse pads, and ahem, dirty mouse balls. All the wireless mice we've looked at recently include a scroll wheel and use RF, typically working up to six feet away from the receiver.

Mouse gunk is a thing of the past with an optical mouse or trackball, such as the Turbo Mouse Pro Wireless from Kensington. Don't put your old PS/2 mouse out to pasture, though. Keep it around in case your system crashes and the drivers for your USB mouse won't load.

However, if your new wireless pointing device uses a USB connection, don't throw your old PS/2 mouse away just yet. USB mice aren't known to work when their drivers aren't loaded, such as when you have to boot in Safe Mode. Keep your old mouse around for backup.

Of the wireless mice we've seen recently, it's hard not to like Microsoft's Wireless IntelliMouse Explorer ($55 to $60; www.microsoft.com). It's attractive, nicely contoured, and has easy thumb access to two programmable buttons that by default act as forward and back buttons for your Web browser. It requires a USB port. If you're left-handed, the contour will annoy you. Go for the IntelliMouse Optical instead.

Logitech's Cordless MouseMan Optical ($50 to $55; www.logitech.com) is accurate, but there's only one extra button (a programmable thumb button). The mouse does work with both USB and PS/2 ports. Lefties should consider the Cordless Optical Mouse as an alternative.

Mice are nice, but so are trackballs. The Kensington Expert Mouse Pro Wireless (about $100; www.kensington.com) isn't actually a mouse, but a trackball. It features a 2-inch ball and has silky smooth rolling action. There are four programmable buttons, plus six more that will launch your favorite apps or Web sites. The model supports USB and PS/2 mouse ports and works well with either hand. Our only gripe is there's no low-battery indicator. CPU

by Kevin Savetz

Dueling Tech Execs

ATI & NVIDIA: He Said, He Said

From next-generation gaming consoles to PC-based virtual reality, 3-D graphics technology is on a nonstop rampage that promises to radically alter how we interact with technology. What is state of the art in today's market? What can we expect for the future? We interviewed the top tech men from the world's two leading graphics companies, ATI (www.ati.com) and NVIDIA (www.nvidia.com), to get their thoughts. Both interviewees fielded the same questions in separate interviews, and the similarities in their responses proved as enlightening as their differences.

Interview:

Adrian Hartog

As Chief Technology Officer and Senior Vice President & General Manager, Consumer Business Unit, for ATI Technologies, Adrian Hartog has headed all ATI R&D efforts for the last 15 years. He holds seven patents and managed ATI's semiconductor business from 1998 to 2000. Under Hartog, ATI's engineering staff has grown from five to 850.

Interview:

David Kirk, Ph.D.

David Kirk has been chief scientist with NVIDIA since 1997. Previous to that, he was a technology consultant and chief scientist for video game manufacturer Crystal Dynamics and an engineer for HP-owned Apollo Systems. Dr. Kirk authored seven patents on graphics design and more than 50 articles on graphics technology.

CPU: What makes your approach to 3-D technology superior to your rivals?

Hartog (ATI): We talk to the leading content developers to understand clearly what they're trying to do. A lot of them are already deploying advanced 3-D techniques using just a basic processor, but they can't really animate them in real-time, or at least they can't use them extensively in their games to get the desired visual effects. What we try to do is take their input and enable them to achieve those visual effects at very high frame rates and at high resolution. I think the other key is we work very closely with Microsoft, sitting with them to develop not just the next generation of their DirectX API but the next two generations, so that we're strongly synching our product releases with the programming models that they're going to be deploying in that timeframe.

Kirk (NVIDIA): One is our relentless execution. We show up with new products at least twice a year, and we drive features from the enthusiast introduction into the mainstream and mobile markets just one or two seasons later. We have extraordinary depth and breadth of product offerings, which allows our architectures to be adopted by people with any set of application needs from consumer to professional workstation, as well as any budget, from enthusiasts down into value PCs. I think the other aspect of our leadership is that we're always out there first with new technology. When DirectX 8 was introduced, we were out there with Microsoft promoting the same features in hardware. We expect to keep doing that over time.

CPU: Apart from Photoshop, practically no desktop applications showcase the performance advantages of one high-end CPU over another, perhaps indicating that there's not as much need for speed as there has been previously. Does this line of reasoning apply to GPUs?

Hartog: I think bleeding-edge GPUs are clearly being driven by professional and productivity applications in the CAD and professional workstation market. A lot of that is around things like authoring, real-time animation for advertisements or movies, architectural designs, all those types of things. At the other extreme are people looking for leading-edge games, and they clearly also push the state of the art in GPUs. As GPU technology is deployed more broadly, you're finding a broader base of applications starting to leverage its power and capabilities. And if you examine Microsoft's roadmap, they're looking at taking advantage of the power in the latest generation of GPUs, like the Radeon 8500, to develop a much richer and more natural user interface in future versions of Windows.

Kirk: Absolutely not. Windows XP has support for not exactly 3-D features on the desktop but a lot of visual features that are normally associated with 3-D, such as transparency, alpha blending in menus fading in and out. These were previously only used in 3-D applications. The GeForce3 running Windows XP is approximately 2,000% faster than older generation hardware running the XP Effects benchmark, which tests the performance of these new features. If you have all the effects turned on, what you're actually doing when you open a menu is redrawing the menu area with transparency and blending hundreds of thousands of times to create this effect of a smooth change. If you don't have the fill rate and the ability to perform these operations at very high rates, you're going to see these operations happen repeatedly and slowly.

CPU: Looking two years into the future, what will your top-end cards allow me to do that I can't do today?

Hartog: I think a lot of that will come down to advances in display technology and user interface technology, but clearly the high-end cards are getting to the point where they can create totally realistic virtual worlds in real-time that people can interact with in a very natural and unconstrained way. That's the kind of power that I see being enabled by future GPUs.

Kirk: We're at a very exciting time in 3-D graphics right now with the advent of programmability in GeForce3 and the adoption of anti-aliasing as a mainstream feature. We're beginning to see much, much higher quality of rendering. Jagged edges of polygons, poorly lit objects and characters, those kinds of things are going to pass by the wayside. GeForce3 is only the beginning of this revolution in realism. Within the next couple of years, you'll see interactive performance and quality that rivals what you see in movies. People have been saying that for a long time, but I really think we're close now. A couple of years ago, I would've said we're 10 years away, but I think it's going to happen a lot more quickly than everybody expected.

CPU: Overclocking is obviously a priority for performance users. How do you walk the fine lines between optimizing your cards out of the box, letting users maximize their own performance, and not letting novices accidentally fry their new purchases?

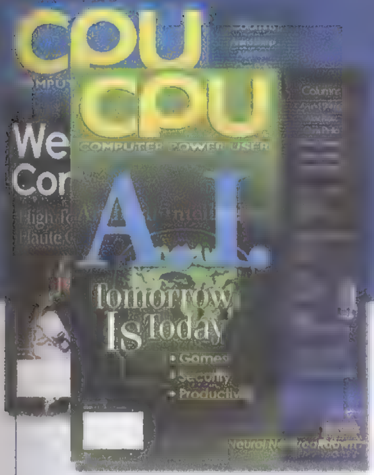
Hartog: The products we deliver are running at a clock speed we think will meet all of the worst-case environmental conditions that a user will come into. But we know people want to do that kind of thing, so we do provide overclocking utilities people can use. And we don't really consume huge amounts of power in our products—if you look at them, you'll find they don't have massive heat sinks and things like that—so even overclocking them to the highest rates they'll function at won't be destructive to the product. It just at some point will create corruption on the screen . . . I don't think our cards will blow up. I do think you'll find, though, that in the latest versions of our products, our clock rates are running at higher rates than the competition.

Kirk: I have to say that our official position is we don't condone overclocking. It's like if you buy a Ferrari, you have to understand that in most states you're not allowed to drive it more than 65 miles per hour. The responsibility that we have to both our manufacturing and end-user customers is to provide a safe, stable, and reliable product. We have to be conservative in when we make our choices for clock rates so that users can have a very good experience. For people who are willing to hang it out there over the edge, they still have some leeway, and it's purely a statistical variation kind of thing. I don't know how much leeway there is in any particular card for overclocking, and it's going to be highly variable. It's going to be kind of a roulette, which I guess is part of the fun.

CPU: Compared to where the desktop market is at today, what will it take to enable hi-res, photo-quality interactive video—for example, "perfect" video, in terms of polygons, fill rates, and other specs? How long will it take us to reach this point?

Hartog: It's hard to say. The really great thing about graphics and GPUs is there's a phenomenal amount of headroom. What we find is that the more we put out there, the more it gets used. The products we're putting out now are probably orders of magnitude more powerful than the products we put out two years ago, but still there are new applications people are developing where they don't feel they're getting enough performance. As you go for this really high degree of realism, people start using an incredible number of textures and polygons, and that creates a tremendous amount of need for higher performance. I can see in the next year, year and a half, we'll get products that are an order of magnitude faster from a performance perspective, but still there will still be applications out there that push those products to their limits. I might say five years until we get "totally realistic" video, but that may not be right.

Kirk: We did a demonstration at SIGGRAPH this year, rendering a scene from "Final Fantasy" with two characters at approximately 12 to 15 frames per second on the Quaddro, which is our high-end CAD product that's based on the GeForce3 product. So we're within a factor of two to five or real-time rendering of that kind of scene. The performance roadmaps we've demonstrated over the last few years are that performance more than doubles every six months. Based on



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that, within a year of the introduction of the GeForce3, you should be seeing the exact movie scenes from "Final Fantasy" rendered in real-time. But you look at "Final Fantasy," and the graphics are wonderful, but you're not going to think it's a real person. What's left to see in the next couple of years is getting from, "Wow, that's wonderful graphics!" to "Why are you showing me that photograph of a woman?" It should look that good. What's needed to generate that level of realism is hundreds of millions, perhaps even billions, of polygons per second. Each of those polygons is rendered as pixels that have thousands or tens of thousands of shading operations applied to each pixel for realistic lighting and materials. Wood looks like wood. A head full of hair has individual strands that reflect light the right way. That sort of thing. And we'll get there in a couple of years.

CPU: Once this "perfect point" is achieved, how do you continue to add performance and value to products?

Hartog: There are two answers to that. One strategy asks how quickly can we take this leading-edge graphics and multimedia technology down into the volume part of the marketplace. We're not just focused on developing the latest and greatest. We want to push the envelope, but also push it into lower-cost systems, as well. Not that many people are going to go out and buy $500 cards, right? At the high end, though, it may not be just about raw pixel throughout. It might turn out to be that we can deliver algorithms that create really realistic skin or hair and can animate them in totally interesting ways. But you're right, if we've achieved everything and the developers can't think of any more ideas they possibly want, then we're clearly in a commodity game, and the whole issue will be who can make products more economically. But I've been in the graphics industry for 15 years now, and we always go through these waves where we think that things are good enough, and it turns out that then there's another major leap in innovation and there's another whole level of performance and functionality that needs to be integrated into our products.

Kirk: There are a number of ways. The enemy of graphics is "good enough," and I don't think we'll get to "good enough" for a long time. You might be able to make a realistic picture of a person, but how about a crowd of people? If you can make a picture of a perfect-looking tree with a million leaves on it, how about a forest full of those trees? There's still more to be done. The other opportunities are in taking that technology and bringing it to the mainstream. When the new technology is introduced that can do interactive, photo-realistic movies, that's going to be an enthusiast and professional workstation product. The evolution of the next couple of years will be in bringing it to the mainstream and to laptops and handhelds. Everything goes up and out and down and across.

CPU: Cost savings aside, what advantages are there to consumers in using a graphics-optimized motherboard chipset, such as ATI's forthcoming A3 or NVIDIA's nForce, versus adding a conventional—and often faster—AGP card?

Hartog: The role of the A3 is to deliver the performance and value of the Radeon in a value desktop and mobile product. We think we've done things in a particular way that allows us to get better performance and higher integration so we can deliver a more cost-effective solution. For these types of products, it's really about finding that balance between performance and cost that is critical. We're not trying to deploy a new graphics engine in that type of product; our customers aren't looking for that. They want something that raises the bar in that value segment.

Kirk: The nForce architecture is designed to be the best platform processing technology independent of the graphics. Our approach in the graphics market has been to produce the best value as well as the best graphics. As we move into the platform processing area, we understand that it's not enough to combine GeForce graphics with a mediocre core logic implementation. Our goal is to produce world-class performance in the entire system. The way we approach that is to look at concurrency in all the different functions that the integrated graphics and memory controller device and the media and communications processor chips perform. They must perform independently at their full performance levels. The nForce is the first platform you can buy that allows you to copy files across your network at the full bandwidth and play 3-D audio and graphics at the same time. With previous technology, the system would be completely consumed by one of those tasks. If you tried to play audio and video and copy files in the background, all you'd hear was audio skipping and all you'd see when playing Quake is chunking and skipping. People will be stunned with the new performance of their PCs.

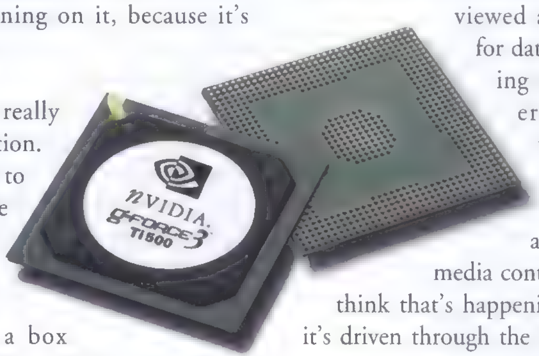
CPU: All-in-one solutions, such as ATI's internal All-In-Wonder or NVIDIA's external Personal Cinema, seem to have remained niche products despite their broad feature range. Are these products too complex for the average user?

Hartog: I don't know that they're too complex. I think the reality is that they're too expensive for the average user. When you put tuners and other types of features into the products, you add 30% to 40% to the basic cost. The main issue is that OEMs are unprepared to carry that as a standard SKU, so it ends up being either a custom option for OEMs or a retail product with smaller volume. It will appeal to people that are knowledgeable enough about graphics and multimedia to go to the store and buy them. It's not going to appeal to the general user off the street who just wants a computer to use and takes whatever Dell or IBM provides them. The things that could drive a broader acceptance are advances from Microsoft, and I think Microsoft has with Windows XP created a more complete, more robust multimedia architecture that allows people to deploy more integrated applications to run on products like the All-In-Wonder.

Kirk: I think certainly, by its nature, the Personal Cinema provides a wide variety of features that not all users may need. Each product has a match in the consumer with similar needs. Not everybody wants to watch DVDs or record and watch TV on their PC. It's a question of what people want to do rather than one of complexity. I think the products are pretty easy to use. I think everybody knows how to use a VCR . . . except for that setting the time part.

CPU: The move to integrate PVR (personal video recorder) functionality into PCs seems obvious, but will PC-based PVRs become commonplace or is the console model bound to win out?

Hartog: The issue there is broad deployment of digital video. People have to come up with very, very cheap boxes. All of the cable and satellite operators know that. Once they've made the transition from analog to digital in the market and they've given the ability to recoup a lot of their bandwidth and infrastructure for providing new services, then you'll start to see richer PVR-type boxes, which in the extreme could be a media server with an x86 architecture. But an x86 architecture is going to be expensive compared to a baseline set-top. If you can deliver enough value, you can justify that architecture, but otherwise what you'll probably see is system-on-a-chip solutions based on like an ARM with Linux running on it, because it's much cheaper.



Kirk: That's a really interesting question. It's always hard to predict. If people want something for their living room, do they want a PC or a box stacked on top of their TV along with the amplifier and CD player? It's more a question of how people want to organize their rooms, I think. The PVR on a PC ends up being more of a kid's bedroom, den, or dorm room kind of application. It just doesn't seem like people want a PC in their living room, although if you take all the capabilities of a PC and hide it in a box that looks like a consumer device, then I think you'll get a lot more adoption. Kind of like a Trojan horse.

CPU: As device networking and convergence progresses, describe your vision of the multimedia-enabled home of the future.

Hartog: There's clearly a desire to create a networked home where the entertainment equipment centers in the home are connected to the bedroom computers and the PDAs and maybe the office computer. When you do that, video and audio become more important because people, wherever they are, will want access to the broadcast capability that's coming into the entertainment center. Microsoft and others are coming up with a lot of client-server solutions for that type of environment. In that space, All-In-Wonder-type solutions become very interesting, so I expect that over the next couple of years you're going to see those kinds of things get deployed.

Eventually, I expect that providers will be successful in converting over the user base to digital streaming video. If people can get their digital rights management stuff under control, then I think you'll see client-server models in the home where devices are connected. Some will be viewed as servers either for data or for computing power, and others that will be viewed as clients for interacting and getting access to multimedia content or services. I think that's happening, but whether it's driven through the PC industry, the set-top industry, or some combination of the two, that has yet to play out.

Kirk: It's an enormous collection of boxes, all with NVIDIA graphics and platform processing chips in them. [laughs] You're going to see a lot more home media hub applications and communications hubs. Technologies like the MCP—the media and communications processor—and future generations of that technology will really enable things like broadband connectivity, security and firewalling, and home networking by phone line or wireless or whatever is cost-effective. They basically provide a gateway and server for all kinds of content—audio, video, other data. That sort of a device as a hub allows you to also have other devices like an Xbox or your bedroom version of a Personal Cinema. Whatever kinds of devices you have, they can all be connected together to share data. You could have one CD library all recorded to share across your network. I think those are the kinds of opportunities you'll see. **CPU**

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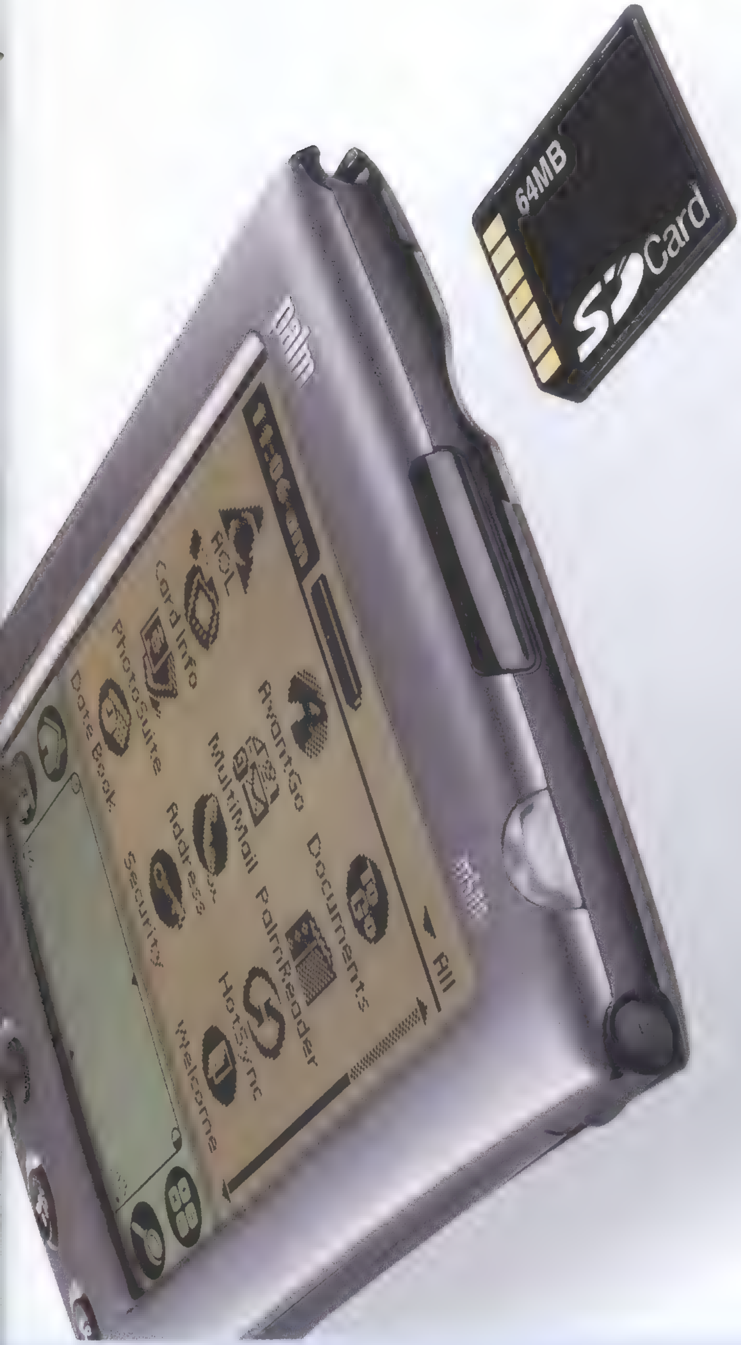

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Under Development

A Peek At What's Brewing In The Laboratory

Fresh from the most influential R&D labs around the world, here's a glimpse at some of the technology that scientists, lab techs, and researchers are cooking up for the future.

Spies Like Flies

What do you get when you cross a university renowned for its counterculture with funding from DARPA (Defense Advanced Research Projects Agency)? Tiny sensor/transmitters that may revolutionize energy savings and help ground troops in enemy territory.

Smart Dust is the name of a University of California, Berkeley research project headed by engineering professor Kristofer Pister. Smart dust "motes" are part sensor, part wireless transmitter fueled by solar power or batteries. The motes run and communicate via a customized OS dubbed TinyOS. Currently, operational motes are flat and about thumb-sized, although the research group hopes to eventually produce units less than a cubic millimeter in size.

Last May, researchers planted motes in Berkeley's Cory Hall, an energy-inefficient building. The sensors monitor light and temperature conditions, collectively forming a "SensorWeb" that will help administrators determine where and how energy is being used inefficiently. Researchers estimate using smart dust motes in California buildings might save the energy-beleaguered state $7-$8 billion annually.

Two months prior, researchers and U.S. Marines dropped motes from an airplane along a dirt road. As trucks passed, the motes detected magnetic changes, collected data on vehicle direction and speed, and relayed data back to the airplane.

Potential future apps range from traffic monitoring to monitoring babies (thus preventing SIDS). Researchers foresee a time soon when virtually the entire world might be equipped with motes.

"In 2010, everything you own that is worth more than a few dollars will know that it's yours," speculates Pister on his UC Berkeley Web site, "and you'll be able to find it whenever you want it. Stealing cars, furniture, stereos, or other valuables will be unusual because any of your valuables that leave your house will check in on their way out the door and scream like a troll's magic purse if removed without permission. (They may scream at 2.4GHz rather than in audio.)"

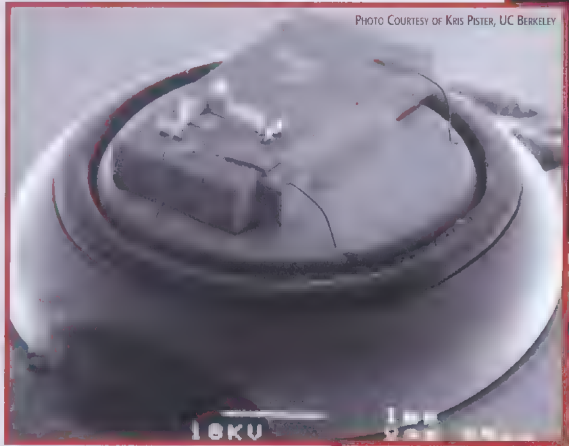


PHOTO COURTESY OF KRIS PISTER, UC BERKELEY

Imagine if everywhere you walked and everything you touched were "alive" with digital sensors that formed a vast, intelligent environment. Perhaps someday, devices like the smart dust mote, pictured above and to the right, will make this a reality.

Beat The Heat

Even Intel's Gordon Moore, inventor of the eponymous law that states CPU processing capacity doubles every 18 to 24 months, has expressed criticism that his statement has held true for more than 30 years. Most experts have anticipated that Moore's Law would stay intact until at least 2010, but few knew exactly how. In late November, Intel gave its answer: the TeraHertz Transistor.

Shrinking transistors from today's 0.18- and 0.13-micron fab technologies isn't the dominant problem. Instead, the power leakage and heat from packing transistors only a few molecules apart poses the biggest hurdle. TeraHertz technology, due to become the dominant process in the second half of the decade, uses new materials and new transistor structures to let chips run faster and cooler. The TeraHertz (literally 1,000 gigahertz) derives from transistors ultimately being able to switch on and off more than 1 trillion times per second. Intel expects the new technology to enable 1 billion-transistor CPUs by 2007. That's 25 times the number present in today's Pentium 4 chips.

TeraHertz achieves its gains in part by dropping resistance 30% and offering 100 times less leakage than contemporary SOI (silicon-on-insulator) schemes. The resulting savings in energy consumption and heat production will enable handheld devices capable of hitherto impossible computing power, perhaps even delivering the Holy Grail of handheld apps: flawless speech recognition.

by William Van Winkle

Is It Live Or HP?

Next time you're at a dance club, check out the DJ. Is he really mixing the tracks or is software? In a December 2000 trial put on by *New Scientist* magazine in a London club, nearly 40% of dance floor devotees were fooled by hpDJ, an application designed by researcher and part-time DJ Dave Cliff of HP Labs Bristol.

hpDJ sifts through a selected menu of songs, analyzing each for duration and beats per minute. A skillful DJ blends and cross-fades one song into the next so there's no break in action, slowly building the tempo into a pounding frenzy before bringing it down again. hpDJ does the same, but better, because computers can more finely discern slight variances in tempos.

The latest version of hpDJ is so special because it implements genetic AI. Clubbers are given Bluetooth-enabled wrist devices that monitor their activity levels. If song combinations increase listener activity on the floor, the system knows this is a successful "healthy" mix. If everyone goes for the bar, hpDJ knows the mix is unsuccessful and it's time to whip up a new groove.

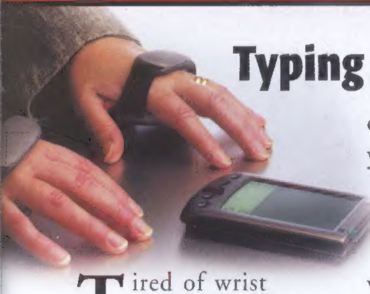
"But that's only the start," says Cliff. "[hpDJ] can also use biofeedback from the crowd as input to a genetic algorithm which then composes new music that gets played to the crowd a few seconds or minutes later. Ultimately, the intention is for a crowd of clubbers to be jointly composing the music they are dancing to, with no DJ and no music producers involved."

Once perfected, hpDJ could become a mainstay at clubs and revolutionize many of the customizable streaming radio stations now gaining popularity.

A Touchy-Feely Knife

A University of Tokyo team, headed by Takuya Nojima, has devised a SmartTool device capable of detecting the boundary between two substances that human senses normally can't. A sensor in the tip of the tool monitors information about the substance it's passing through. Should the substance change, the tool, mechanically connected to a controlling apparatus, exerts an opposing force that the wielder perceives as "virtually hard."

The SmartTool has been shown to discern the difference between a hard-boiled egg white and the underlying yolk, as well as the barrier between water and oil. The most-lauded future application may be in surgery, wherein SmartTool scalpels will help surgeons from accidentally slicing veins or fragile organs. The device should also prove invaluable for training.

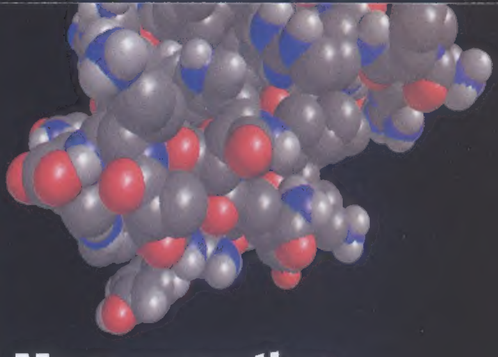


Typing On Thin Air

Tired of wrist strain from typing on bad keyboards? Want to stay productive while waiting for the train? (More productive than using a PDA, anyway.) Due for retail sale in 2Q 2002, the Senseboard Virtual Keyboard is a pair of devices that strap onto your hands. Sensors pressed against your palms detect finger motions, translating them into what would normally be keystrokes. Tap the letters ASDF on your leg or other surface and ASDF appears on-screen. The Senseboard can also render mouse movements.

"It is also possible to type in the air, but as an ergonomist, I would not recommend that," advises Senseboard Technologies AB president Gunilla Alsiö.

A wired Senseboard is expected to retail for $150 and Bluetooth versions for $200. The device—to be used with PDAs, smart phones, and wearable computers—is targeted at journalists, students, or others who value typing at regular speed anywhere.



Megacomputing @Home

Still watching flying toasters during your PC's idle hours? Consider putting your spare CPU cycles to better use. You've probably heard of the SETI@Home project, which uses a screen saver to crunch radio satellite data in the search for extraterrestrial intelligence. DC (distributed computing) projects such as SETI@Home let potentially millions of small computers collaborate on tasks even supercomputers can't feasibly tackle. SETI@Home's downside is that no solid results of extrasolar activity have surfaced.

Don't be discouraged, though. A similar effort called Folding@home (folding.stanford.edu), run by the Pande Group at Stanford University's Chemistry Department and backed by Intel, uses DC to model how proteins fold, the process by which proteins self-assemble into the shapes that will dictate their biological functions. Researchers hope to learn how to synthetically create polymers to perform the same functions. If proteins "misfold," they may clump together, leading to diseases such as Alzheimer's, CJD (Mad Cow), and perhaps forms of cancer. Idle CPU cycles can help further research. Version 1.x has already yielded folding-model successes. Version 2.x (now available) will target more complex misfolding analyses.

Across the Atlantic, the DataGrid (web.datagrid.cnr.it) project is gearing up to process the petabytes of data (a petabyte equals a quadrillion bytes) expected to emerge from CERN's "large hadron collider" facility outside of Geneva when it goes online in 2006. However, whereas the @Home projects process small data chunks offline and upload them upon completion, DataGrid will be an online, real-time system that tackles problems in physics, meteorology, genetics, and more. Thus far, participation in DataGrid is limited to research institutions.

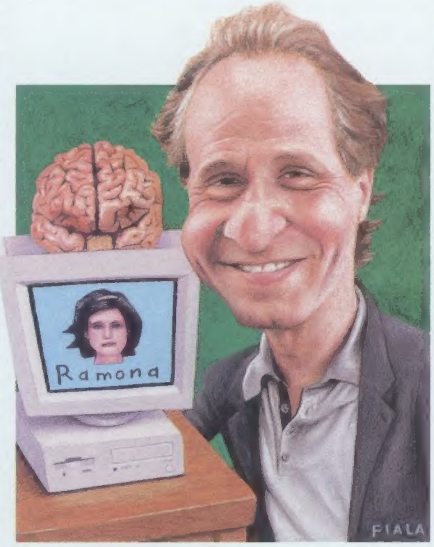
Q&A With Ray Kurzweil

One of the primary shapers of today's technology speaks out on the future of artificial intelligence. MIT graduate Raymond Kurzweil is the inventor-genius we all long to be. As a teenager, he demonstrated on TV a gadget he'd built that could develop original music scores based on songs it had heard, and in 1982, he invented the first synthesizer capable of rendering orchestra-quality sounds. Additionally, Kurzweil was chief developer of the first omnifont OCR package, the first CCD flatbed scanner, and the first publicly marketed speech recognition application. Kurzweil's two books, "The Age of Intelligent Machines" and "The Age of Spiritual Machines," reflect his passionate interest in artificial intelligence.

Q To what degree is AI development fettered by hardware, software, or human ingenuity?

KURZWEIL: AI development is limited by both hardware and software, but both areas continue to develop through human ingenuity. The next [computing] paradigm, already being developed in many laboratories, will consist of 3-D circuits built at the molecular level. However, even our current paradigm of flat integrated circuits will provide sufficient computing power before 2020 to emulate human brain function.

The software of intelligence is probably the more salient issue. Here, a primary source of knowledge about how to build an intelligent entity is reverse engineering the human brain, a grand project already well under way and further along than most people realize. Our knowledge about human brain function is also growing exponentially. As one example of many, Lloyd Watts, a scientist in California, has successfully reverse-engineered more than a dozen regions of the brain having to do with the processing of auditory information. It is a conservative scenario to expect that we will have detailed models of all regions of the brain before 2030, which will provide us with the templates of human-level intelligence.



Q What is your assessment of AI's treatment in popular fiction?

KURZWEIL: A common failure in science futurism movies is to take a single concept and employ it in a world that is otherwise indistinguishable from today, as if nothing else would change by that time. "A.I." had near-human-level androids, but everything else, from the roads to the coffee makers and books, were just like today. The reality is that we will have change at many levels simultaneously. So by the time we have androids at human or near-human levels, we will also have ubiquitous virtual reality, embedded intelligence in everyday objects, intimate extensions to human intelligence through noninvasive neural implants, and many other changes.

Q In what ways is AI being best applied in everyday contemporary life?

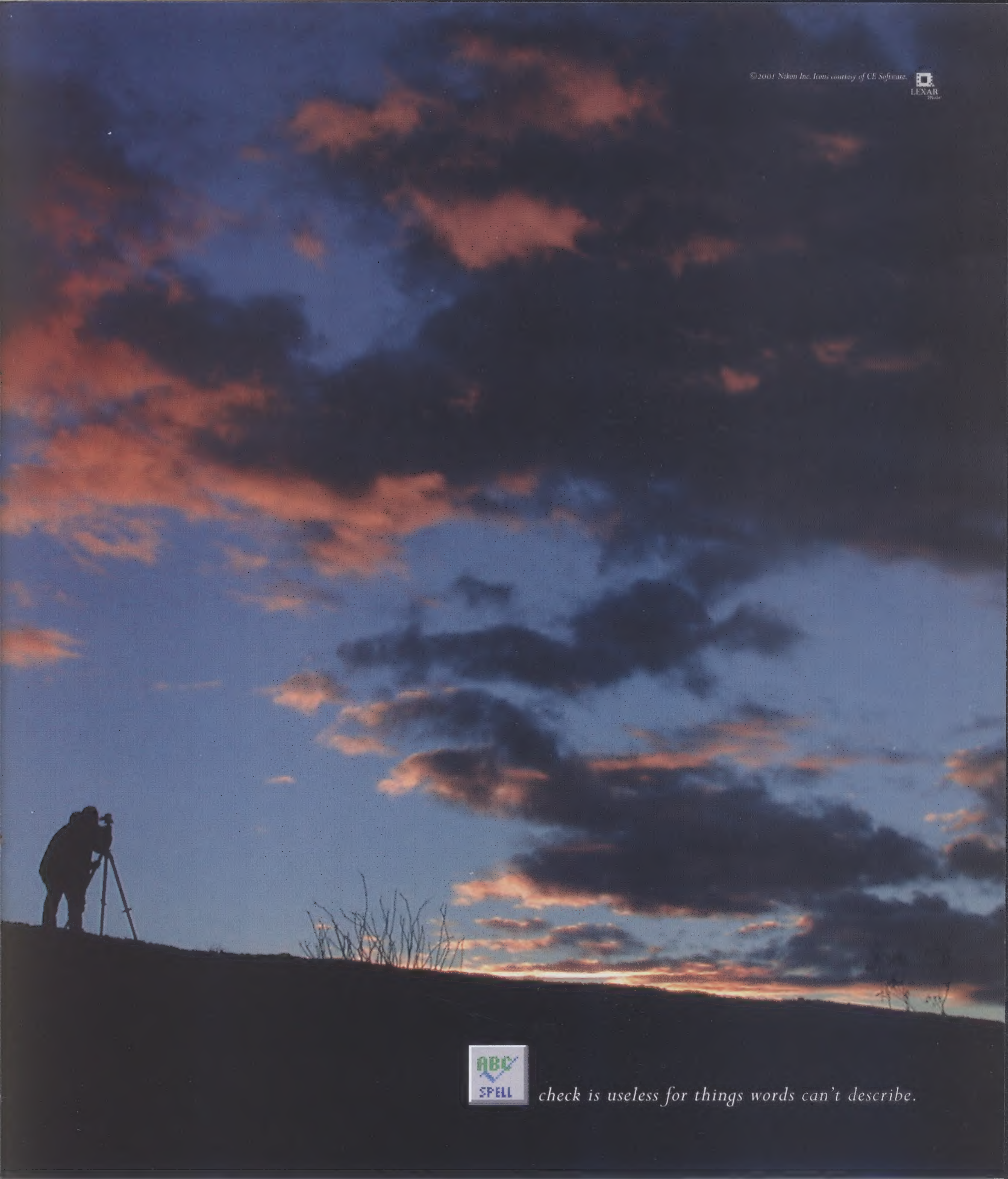
KURZWEIL: Today, we have many examples of "narrow AI," by which I mean systems that can perform functions that used to require intelligent humans to perform. These include playing many different types of games at master levels, landing jet planes, guiding cruise missiles, making medical diagnoses, evaluating electrocardiograms, recognizing pathogenic cells in blood cell images, recognizing human faces, assisting human artists and musicians in real-time, making financial investment decisions, and a myriad of other tasks. In contrast, "strong AI" would refer to a machine that could emulate the full range of human intelligence, including our mastery of human language and our wonderful ability to understand situations in a panoply of contexts.

Q Science fiction authors are fond of hyping up futures where man and machine are integrated at the biological level, perhaps even turning us all into network nodes. Is this a plausible scenario or grandiose fancy?

KURZWEIL: I've consistently said that we will have the hardware by 2020, but it will take until 2030 before we have the software. For medical reasons, some of us already place computers in our brains. I've described a scenario involving nanobots (microscopic robots the size of blood cells) that can go into our brain through our capillaries and directly interact with our biological neurons. We will be spending a great deal of our time in full immersion virtual reality environments involving all of the senses. In virtual reality, we will encounter other people, some of whom represent other biological humans, and some of whom have no biological counterpart. CPU

For our complete interview with Ray Kurzweil, go to www.smartcomputing.com/cpumag/feb02/kurzweil.

William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He lives outside of Portland, Ore., with his wife, where they are expecting their first child.



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